DOCUMENT RESUME

ED 479 270 SP 041 685

AUTHOR	Green, Cynthia P.
TITLE	Improving Breastfeeding Behaviors: Evidence from Two Decades of Intervention Research.
INSTITUTION	Academy for Educational Development, Washington, DC.
SPONS AGENCY	Agency for International Development (IDCA), Washington, DC. Office of Nutrition.
PUB DATE	1999-11-00
NOTE	73p.; Published by LINKAGES (Breastfeeding, Complementary Feeding, and Maternal Nutrition Program). Support provided by the USAID Bureau for Global Programs, Field Support and Research, Office of Health and Nutrition (G/PHN/HN).
CONTRACT	HRN-A-00-97-00007-00
AVAILABLE FROM	LINKAGES Project, Academy for Educational Development, 1825 Connecticut Avenue, N.W., Washington, DC 20009. Tel: 202-884-8000; Fax: 202-884-8977; e-mail: linkages@aed.org; Web site: http://www.linkagesproject.org.
PUB TYPE	Information Analyses (070)
EDRS PRICE	EDRS Price MF01/PC03 Plus Postage.
DESCRIPTORS	*Breastfeeding; Developing Nations; *Early Intervention; Females; Foreign Countries; Health Behavior; Hospitals; *Infant Care; Mass Media ; Peer Counseling; Prenatal Care; Program Effectiveness; *Public Policy; Social Support Groups
IDENTIFIERS	Armenia; Bangladesh; Brazil; Chile; Ghana; Guatemala; Honduras; India; Indonesia; Jordan; Kenya; Mali; Mexico; Nicaragua; Norway; Panama; Peru; Philippines; Psychosocial Factors; Scotland; South Africa; Sweden; Turkey

ABSTRACT

This report summarizes research on interventions intended to improve four key breastfeeding behaviors: early initiation of breastfeeding, feeding of colostrum to newborns, exclusive breastfeeding for the first 0-6 months, and continued breastfeeding through the second year and beyond. It clarifies what is known about improving these practices in order to guide program planners and managers. Over 50 studies worldwide were identified that had an intervention designed to influence one of the four behaviors and reported data on one or more of those behaviors. Results indicated that only 1 of the 51 studies examined the impact of national policy changes, and few examined the impact of prenatal education in isolation from other interventions. Some results suggested that prenatal education, when combined with other interventions (e.g., training of health providers and access to outpatient breastfeeding support clinics) related to improved breastfeeding practices. Many studies documented the impact of changing hospital practices, noting that counseling and discharge packs supporting breastfeeding, and training of hospital staff in lactation management, dramatically impacted exclusive breastfeeding rates. Most studies suggested that peer counseling and social support positively impacted initiation of breastfeeding, giving of colostrum, and exclusive breastfeeding. Evidence regarding the impact of postpartum counseling and guidance by health workers was mixed. An appendix presents detailed tables on interventions to improve breastfeeding behaviors. (Contains 115 references.) (SM)

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Improving Breastfeeding Behaviors: Evidence from Two Decades of Intervention Research

Cynthia P. Green, Ph.D.

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Improving Breastfeeding Behaviors: Evidence from Two Decades of Intervention Research

November, 1999

Cynthia P. Green, Ph.D.

Improving Breastfeeding Behaviors: Evidence from Two Decades of Intervention Research is a publication of the LINKAGES (Breastfeeding, Complementary Feeding, and Maternal Nutrition Program) Project. LINKAGES is supported by the G/PHN/HN, Global, U.S. Agency for International Development, under Cooperative Agreement No. HRN-A-00-97-00007-00 and managed by the Academy for Educational Development. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

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Acknowledgments

LINKAGES and other AED staff made numerous contributions to this report. Margaret Parlato formulated the initial concept, provided a useful list of questions that the research should (but usually does not) answer, and maintained a focus on the results. Luann Martin shepherded the process through its long gestation, provided many helpful inputs, and edited the final product. Cindy Arciaga Lauer and Takema Robinson conducted dozens of literature searches and located hundreds of documents. Jay Ross and Kirk Dearden reviewed the summaries of the studies carefully and raised important questions about the methodological weaknesses of specific studies. Kirk Dearden rewrote the last section to reflect these issues. These staff as well as Jean Baker, Sandra Huffman, Carol Baume, Wellstart staffers (Janine Schooley and Ann Brownlee), Judy Canahuati, and Katherine Dickin reviewed the draft and provided many important insights. All these inputs significantly improved the final product.

Executive Summary

This paper summarizes available research on specific interventions intended to improve four key breastfeeding behaviors:

- Early initiation of breastfeeding (ideally within the first hour after birth)
- Feeding of colostrum to the newborn
- Exclusive breastfeeding for the first 0-6 months
- Continued breastfeeding through the second year and beyond.

These four behaviors are strongly linked to the prevention of infant malnutrition and illness. The purpose of this report is to clarify what is known from existing research about improving these practices in order to guide program planners and managers. The focus of the fourth behavior (continued breastfeeding) is on the breastfeeding behavior and not on other feeding practices associated with complementary feeding.

After an extensive literature review, 51 studies were identified that met two criteria: (1) having an intervention designed to influence one of the four breastfeeding behaviors; and (2) reporting data on one or more of the four behaviors. No study was rejected on the basis of its methodological limitations, but these weaknesses are specified in the summary tables in Appendix B. Of the 51 studies reviewed, 24 were conducted in Latin America and the Caribbean, nine in Asia, four in sub-Saharan Africa, three in the Near East, one in the Newly Independent States, and ten in Europe and the United States.

Key Findings

Results need to be interpreted cautiously because most studies suffer from major methodological limitations, including flawed designs making it impossible to sort out what works and what does not; inadequate controls; failure to account for confounding variables; participant self-selection; and small sample sizes. Even so, in some instances, there is sufficient evidence from a few rigorous studies to draw conclusions about recommended interventions with some degree of confidence.

National Policy Changes

Only one of the 51 studies reviewed here examined the impact of national policy changes. This study reviewed practices before and after the Kenya Ministry of Health implemented a breastfeeding promotion program, which included the adoption of a Code of Marketing of Breastmilk Substitutes, directives to all hospitals to stop distributing infant formula, the promotion of early breastfeeding, and training of health workers. After policy implementation, hospital policy-makers and maternity ward staff were more knowledgeable about breastfeeding and their practices improved dramatically. Clearly, more policy research is needed to determine if and how changes at the policy level affect breastfeeding behaviors.

Prenatal Education

Few studies focused on the impact of prenatal education in isolation from other interventions. However, some results suggest that prenatal education, when combined with other interventions, (such as training of health providers, changes in hospital policies to allow early breastfeeding and contact with the newborn, and access to an outpatient breastfeeding support clinic), is associated with improved breastfeeding practices. One study found that mothers in their last three months of pregnancy who had access to health promoters had higher rates of exclusive breastfeeding at one, four, and six months postpartum. Other studies suggested that the same results can be obtained through the distribution of educational pamphlets. Yet other studies pointed to no impact.

Changes in Hospital Practices including Health Worker Training

There are numerous well-executed studies relating to the impact of changing hospital practices. On the whole, they suggest that:

- counseling (especially individual counseling) and discharge packs that are supportive of breastfeeding can have a dramatic and positive effect on exclusive breastfeeding rates,
- training of hospital staff in lactation management can likewise have a dramatic, positive effect on exclusive breastfeeding,
- once women are discharged from the hospital, home visits are influential in extending the period of exclusive breastfeeding, and
- changes in hospital practices influence early breastfeeding behavior but are less likely to have a long-term impact.

Mass Media and Print Materials

There are few definitive studies on the impact of mass media on breastfeeding behaviors. Of the studies that were sufficiently rigorous to draw conclusions about impact, none of them singled out mass media relative to other interventions. Given the methodological limitations associated with these studies, it is not yet possible to draw conclusions about the impact of mass media on breastfeeding practices.

Peer Counseling and Education

A majority of studies lend credence to the notion that peer counseling and social support in general have a positive effect on the initiation of breastfeeding, the giving of colostrum, and exclusive breastfeeding. In particular, home visits appear to play a critical role in supporting women's breastfeeding behaviors and have been associated with longer durations of exclusive breastfeeding. In general, mothers visited more frequently are more likely to adopt recommended behaviors than those visited less often or not at all.

Women's Groups

Surprisingly little research has been conducted on the breastfeeding impact of support groups—whether groups are established expressly to encourage mothers to breastfeed, as in La Leche League groups, or whether groups have a different goal, for example, receiving credit or sharing information. One study, carried out by Freedom from Hunger in Ghana, strongly suggests that women who participate in "Credit with Education" groups are more likely to give colostrum than women from the same communities who do not participate in the groups and women from comparison communities. Mean age at introduction of water and watery foods for participating mothers is also significantly lower.

Postpartum Counseling and Guidance by Health Workers

Evidence regarding the impact of postpartum counseling and guidance by health workers is mixed. For instance, in one study, counseling and referrals by community volunteer breastfeeding advocates did not increase the prevalence or duration of exclusive breastfeeding. In another study, individual counseling and monthly clinical support collectively contributed to higher rates of exclusive breastfeeding at six months postpartum. Clearly, more research on counseling is needed to identify what works in different settings. These studies should document the impact of various counseling approaches, provided by a variety of individuals, including breastfeeding advocates, community health workers and clinic-based staff.

The challenge for the future is to improve the quality of breastfeeding interventions to ensure that they are reaching priority audiences, providing support to mothers throughout the various stages of breastfeeding, conveying well-designed messages effectively, and measuring impacts on behavior. Programs also need to strive to sustain individual behavior change and educate and support new audiences.

Future Research

This review demonstrates the need to strengthen research on early initiation of breastfeeding, the giving of colostrum, and exclusive and continued breastfeeding. Future research will need to carefully consider geography, methodology, and content. Almost half of the studies reviewed were done in Latin America. More research is needed in other geographical regions, particularly Africa and the Middle East. More rigorous studies are needed—ones that include baseline and follow-up data collection and information from program participants and controls. Just as importantly, well-designed operations research is needed to help identify which interventions and combinations of interventions change breastfeeding behavior.

Additional research is needed in seven key areas to address the following information gaps:

- Audience analysis to identify mothers most in need of breastfeeding education;
- Effectiveness of mothers' support groups (in isolation and in combination with other interventions) in promoting exclusive and continued breastfeeding;
- Influence of peer counselors on breastfeeding behaviors;
- Role of mass media in changing breastfeeding behaviors and sustaining behavior change;
- Feasibility of using interpersonal networks ("trend-setters," "positive deviants," and "early adopters") to diffuse optimal breastfeeding behaviors;
- Cost-effectiveness of programs; and
- Impact of changing national policies on the quality of services, breastfeeding behaviors, and providers' knowledge, attitudes, and practices.

I. Introduction

This paper summarizes available research on specific interventions intended to influence four key breastfeeding behaviors:

- Early initiation of breastfeeding (ideally within the first hour after birth)
- Feeding of colostrum to the newborn
- Exclusive breastfeeding for the first 0-6 months
- Continued breastfeeding through the second year and beyond.

These four behaviors are strongly linked to the prevention of infant malnutrition and illness. The purpose of this report is to clarify what is known from existing research about improving these practices in order to guide program planners and managers. The focus of the fourth behavior (continued breastfeeding) is on the breastfeeding behavior and not on other feeding practices associated with complementary feeding. Complementary feeding interventions are discussed in another LINKAGES paper entitled *Interventions to Improve Complementary Food Intakes of 6-12 Month Old Infants in Developing Countries: What Have We Been Able to Accomplish?* (Caulfield et al., 1998).

Sections II, III, IV and V of this report review the research evidence pertaining to each of the four breastfeeding behaviors. The next two sections discuss cross-cutting issues: Section VI covers the timing of various interventions, gives recommendations regarding the relative priority of specific interventions and stresses the need for more detailed audience analysis. Section VII lists key findings as a guide to program managers. Section VIII specifies areas for future research. All research studies included in the review are listed in Tables 1-8 and are starred in the Bibliography (Appendix A).

Studies were identified through database searches by the staff of LINKAGES' Information Resource Center, telephone conversations with experts, and a review of Wellstart International publications and the bibliographies of relevant studies. Through this review of articles in English, French, and Spanish published between 1978 and 1998, 51 studies were identified that used specific interventions or combinations of interventions to improve at least one of the four key breastfeeding behaviors. Although hundreds of studies were examined, most were excluded because they failed to provide both: (1) information on specific interventions implemented to change breastfeeding practices and (2) data on changes in at least one of the four breastfeeding behaviors over time or among groups receiving different treatment regimens. Most studies did not report indicators of nutritional status—the ultimate test of effective impact.

Of the 51 projects reviewed, 24 were in Latin America and the Caribbean, nine in Asia, four in sub-Saharan Africa, three in the Near East, one in the Newly Independent States, and ten in Europe and the United States.

Many of the studies reviewed had shortcomings in their research design such as the lack of an appropriate control group or baseline behavioral measurements, small sample size, self-selection of participants and high attrition (drop-out or loss to follow-up). These weaknesses are noted, where relevant, and have been taken into consideration in assessing the impact of various interventions. However, due to the scarcity of well-designed and well-executed studies on breastfeeding interventions, any study that met the basic criteria was retained.

The studies reviewed are presented in a series of eight tables, with two tables dealing with each of the four specific breastfeeding behaviors: early initiation, feeding colostrum, exclusive breastfeeding, and continued breastfeeding. At the end of each of Sections II, III, IV, and V is a summary table of the interventions to improve the breastfeeding behavior discussed in that section. More descriptive tables with infor-

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mation on each study's population, limitations, and results are found in Appendix B. Within each table the studies are categorized into three types based on study design:

Study Design A. Studies comparing intervention and control or comparison groups before and after the intervention (29 percent of the studies).

Study Design B. Studies comparing intervention and control or comparison groups (no baseline) (38 percent of the studies).

Study Design C. Studies comparing the same group(s) before and after the intervention (no control group) (33 percent of the studies).

Within these categories, studies are arranged alphabetically by country, with developing countries followed by developed countries.

The pre-post design with a control group (type A) is the most rigorous of these designs. Study types B and C are seriously flawed. Without baseline data (type B), we do not know that the control group is really comparable with the intervention group. Without a control group (type C), we cannot be certain that factors other than the intervention may have led to changes in behavior. All studies reviewed have some deliberate intervention (i.e. they are experimental). Nearly all of the studies reviewed are quasi-experiments, in which some manipulation or intervention is examined. Only seven studies are true experiments, with randomization of treatment among subjects: Dungy et al., 1992/U.S.A.; Frank et al., 1987/U.S.A.; Haider et al., 1996/Bangladesh; Langer et al., 1996/Mexico; Neyzi et al., 1988/Turkey; Rivera et al., 1993/Honduras; Waldenström and Nilsson, 1994/Sweden; these studies are all type A.

Readers should place the greatest weight on evidence provided by studies in the type A category. Further guidance on study quality can be found in the "Methodological Limitations" (modified after WHO, 1998) column of the four tables using the following numbering system:

1. Inadequate control: (a) pre-post comparison without control group, (b) inadequate documentation of between-group differences and similarities, and (c) behavioral measurements inadequate or lacking.
2. Confounding variables not controlled.
3. Self-selection of participants.
4. High attrition (more than 10 percent attrition rate unevenly distributed).
5. Undetermined internal validity: unreported attrition, poorly documented methodology, or unpublished brief communication.
6. One-to-one comparison.
7. Long recall period.
8. Unclear definition of breastfeeding indicators.
9. Based on planned or reported breastfeeding.
10. Small sample size (< 100).

The "Conclusions" column in the tables in Appendix B provides guidance on the weight of the evidence for each study's findings. One to two page summaries of each study are available in a companion LINKAGES publication entitled *Interventions to Improve Breastfeeding Behaviors: Detailed Summaries of 51 Studies (Green, 1999).*

This review underscores the need for careful research on breastfeeding interventions in order to develop an optimal combination of interventions that can be tailored to local conditions.

II. Interventions to Promote Early Initiation of Breastfeeding

For hospital deliveries, early initiation of breastfeeding—ideally within the first hour after birth—is largely determined by the practices of delivery room and maternity ward staff. Accordingly, the key interventions are to ensure that (1) hospitals' policies and procedures permit and encourage early initiation and (2) health workers assigned to the delivery room and maternity ward are trained and motivated to ensure early mother-infant contact. Of the 14 studies of interventions to influence early initiation, six studies examined the combination of changing hospital policies and training hospital workers. Two studies looked at changing hospital policies as a separate intervention, and one study examined training of hospital workers separately. The remaining five studies dealt with use of peer counselors, mass media and women's groups (see Table 1, page 8 and Table 5, pages 42-46). The tables list the studies alphabetically by country, with developing countries first followed by developed countries. The following sections provide more detail on the research findings related to early initiation of breastfeeding.

Changing Hospital Policies and Training Hospital Workers

Hospital policies and routine procedures can be a major obstacle to early initiation. If hospital norms dictate that the newborn infant be taken away from the mother and not returned for a considerable period, the mother is usually powerless to change the status quo. Similarly, if hospitals routinely provide breastmilk substitutes and bottles to newborns, mothers may be unable to initiate breastfeeding during their hospital stay. At the same time, policy changes need to be implemented by health workers in the delivery room and maternity wards. Thus, training these workers to initiate early mother-infant contact, to assist mothers who are breastfeeding for the first time, and to counsel mothers on breastfeeding techniques is an important part of translating policy changes into routine procedures.

Six studies reviewed compared rates of early initiation prior to and after a change in hospital policies. Most of these studies examined the effects of a package of interventions, including early mother-infant contact and suckling, rooming-in, and avoidance of prelacteal feedings as well as training of hospital workers. Following are the major findings of the studies that measured the timing of breastfeeding initiation:

- **Chile.** In Santiago, Chile, the Clinical Hospital of the Catholic University looked at the effects on breastfeeding initiation of several interventions. Changes in hospital policies included early mother-infant contact, rooming-in and reduction in supplementary feeding. Hospital activities to promote early initiation included teaching and booklets on breastfeeding, assistance in using proper breastfeeding techniques, and a lactation clinic. Other interventions as part of this effort were training of health providers and prenatal education, through workshops for pregnant women and brochures about breastfeeding. Among the intervention group of new mothers, the average time from birth until breastfeeding initiation was 2.8 hours, compared with 6.7 hours among the control group, who received routine maternity care (Valdés et al., 1993; Pérez and Valdés, 1991).
- **Honduras.** In Honduras, the PROALMA project worked closely with three urban hospitals to promote breastfeeding initiation soon after birth, elimination of bottle feeding of breastmilk substitutes, and other baby-friendly initiatives. PROALMA trained hospital staff and visited new mothers in hospital. A 1982 survey prior to the project found that none of the women surveyed had initiated breastfeeding during the first hour after birth. A follow-up survey in 1985 found that

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more than 50 percent of the mothers in two of the three hospitals had initiated breastfeeding within one hour of birth (Popkin et al., 1991).

- **India.** In India, health workers at a government-funded district hospital (Sadar Hospital in Hajiur, Bihar) received on-the-job training in lactation management. Soon after this intervention, all mothers delivering at the hospital received breastfeeding education and assistance. Among these women, rates of breastfeeding within an hour after delivery rose to 60 percent, compared with 3 percent among women in a control group who received no education. In the group that received education, fewer mothers fed prelacteal foods, compared with the control group (Prasad and Costello, 1995).
- **Indonesia.** In Indonesia, the Bethesda Hospital in Minahasa introduced rooming-in in 1982, and the proportion of newborns who were exclusively breastfed at discharge rose steadily, from 33 percent in 1985 to 61 percent in the first quarter of 1986. The hospital subsequently trained its staff in lactation management, made sure that newborns were immediately put to the mother's breast, and prohibited prelacteal feedings. For the final nine months of 1986, exclusive breastfeeding at hospital discharge rose further to 94 percent among newborns. These findings suggest that a higher proportion of infants were breastfed earlier than before, but data on early initiation were not reported (Gerung, 1989).
- **Mexico.** In Mexico, the Mexico City General Hospital adopted a breastfeeding promotion program with three components: (1) in-service training in lactation management for 110 pediatrics and obstetrics staff members, including physicians, nurses, and social workers; (2) classes for first-time mothers on breastfeeding advantages and techniques; and (3) changes to improve breastfeeding initiation, such as replacing materials previously provided by commercial sources with breastfeeding information. After the program was implemented, the average time between delivery and first nursing for first-time mothers was reduced from 1.6 to 1.3 hours. Although this difference was not statistically significant, the study did find that the proportion of infants still being nursed at 16 weeks was higher among the intervention group than the pre-intervention control group and that infants in the intervention group were healthier and had more weight gain than those in the control group (Vandale-Toney, 1992).
- **Brazil.** In Brazil, a study comparing two hospitals illustrates the importance of ensuring that baby-friendly hospital policies are systematically implemented. In the hospital that made a concerted effort to implement breastfeeding promotion policies, more than 85 percent of the mothers held their newborn infant in the delivery room, had no separations during their hospital stay, and heard a talk about breastfeeding; 72 percent received help with breastfeeding the first time. In the other hospital, breastfeeding promotion was not as widespread: 59 percent of the mothers held their newborn infant in the delivery room, 69 percent had no separations during their hospital stay, 18 percent heard a talk about breastfeeding, and 34 percent received help with breastfeeding the first time. In the hospital with the stronger breastfeeding promotion program, nearly half (46 percent) of the mothers breastfed their infant within a half-hour of birth, compared with three percent of the mothers in the hospital with the weaker program (Sanghvi, 1995).

A few studies lend support to other hospital policies and practices:

- **Sweden: Minimizing sedation during labor**. One factor that may inhibit early suckling is the sedation of moth-

ers during labor and delivery. A study in Sweden reported that infants born to mothers who had been sedated during labor were more likely to not suckle at all after delivery or to suckle incorrectly, compared with those whose mothers had not been sedated (Righard and Alade, 1990).

- **Mexico: Rooming-in**. Rooming-in is important to maintain mother-infant contact and to promote frequent nursing. A study in Mexico among low-income urban women found that women in a hospital with rooming-in breastfed their infants within seven to nine hours after birth, compared with 28 hours postpartum among those in another hospital where infants were kept in a nursery. Similarly, the women with rooming-in breastfed three to four times during their hospital stay of 19-22 hours, whereas those whose infants were in a nursery breastfed less than one time on average (Pérez-Escamilla et al., 1992).

Three studies found evidence that training had a positive influence on the practices of hospital staff:

- **Chile.** In Chile, a three-day lactation course led to changes in the practices of maternity ward staff. After the course, more staff members reported that infants were fed colostrum and that rooming-in was practiced. They were also more likely to assist mothers with their first nursing and to supervise their breastfeeding technique (Valdés, 1994).
- **Honduras.** In Honduras, a 1982 survey found that only 27 percent of urban health professionals recommended that women initiate breastfeeding at birth. After the PROALMA project trained health professionals in three major urban hospitals in breastfeeding techniques, the proportion of urban health professionals recommending breastfeeding initiation at birth rose to 87 percent in 1985 (Popkin et al., 1991).
- **Kenya.** In Kenya, the Ministry of Health trained more than 800 health workers in breastfeeding promotion and lactation management. Seven years later, the proportion of health workers surveyed who reported putting infants on the mother's breast within one hour after birth rose from 14 percent to 61 percent. The proportion giving prelacteal foods fell from 93 percent in 1982 to 48 percent in 1989 (Bradley and Meme, 1992).

Two studies did follow-up assessments six months or longer after training:

- **Honduras.** In Honduras, the PROALMA Project trained about 80 percent of health professionals in three major urban hospitals and a health center. Changes in breastfeeding initiation and exclusive breastfeeding were found after two years (1983-85) of project activities, which included hospital and home visits, community talks, and print materials. In 1982 none of the mothers initiated breastfeeding during the first hour after birth. In 1985 more than half of the mothers in two of the three hospitals initiated breastfeeding within the first hour (Huffman et al., 1991; Popkin et al., 1991).
- **India.** In the India study that assessed the impact of on-the-job training of health workers at a government-funded district hospital, the researchers returned six months after the intervention to discover that by then only 36 percent of the women delivering in the hospital had received breastfeeding education. Only 14 percent of the mothers in this later group had initiated breastfeeding within an hour after delivery, compared with 60 percent of mothers interviewed soon after the intervention. The researchers attribute the reduction in coverage to staff turnover and dilution of training. They recommend refresher courses every six months (Prasad and Costello, 1995).

These findings suggest that training and supervision need to be ongoing and should include mechanisms to ensure that the recommended hospital practices become routine.

The synergistic effect of combining changing hospital policies with training hospital workers is suggested by the Indian study by Prasad and Costello (1995), which is the only study reviewed to implement hospital training without changes in policy. One could speculate that the reduced effect six months after training hospital staff might have been mitigated if the hospital had adopted a policy that every newborn would be put to breast immediately after delivery. If new staff were informed that early initiation was the norm, they might have implemented it more diligently.

Prenatal Education

Prenatal education, either by health workers during prenatal visits or in childbirth education classes, is thought to influence women's decision to breastfeed and to convey skills that are helpful in initiating breastfeeding. The only intervention study reviewed that assessed the impact of prenatal education on breastfeeding behaviors (Pugin et al., 1996/Chile) did not measure the timing of early initiation, although it did find a positive effect on breastfeeding at six months postpartum.

Given the dearth of research studies, no conclusions can be reached regarding the benefits of prenatal education on early initiation. It is possible that the effects differ, depending upon whether the cultural norm supports the universality of breastfeeding newborns.

Peer Counselors and Other Social Support

Two intervention studies examined the impact of peer counselors as breastfeeding advocates and educators.

- **United States.** A Chicago, Illinois, USA study found that regular contact with a volunteer peer counselor appears to help both breastfeeding initiation and exclusive breastfeeding. Volunteer peer counselors talked with clients before delivery, at least twice weekly until breastfeeding was established, every one to two weeks for the next two months, and then as needed. Women in the counseling group were more likely to be exclusively breastfeeding at hospital discharge and at 12 weeks postpartum than controls (Kistin et al., 1994).
- **Mexico.** Having another woman provide psycho-social support to first-time mothers at the time of delivery is thought to increase mothers' confidence and perhaps convey breastfeeding skills. An experimental study in Mexico recruited retired nurses and other women (known as "*doulas*") to assist first-time mothers during labor and delivery and to visit them in the maternity ward to discuss breastfeeding techniques. The *doulas* were paid and received three weeks' training. The study identified some benefits from support during labor, but the intervention had no significant impact on early initiation of breastfeeding. Only 11 percent of the women assisted by the *doulas* and eight percent of the control group breastfed in the first eight hours after birth; this difference is not statistically significant (Langer et al., 1996). The lack of impact may be attributed to the fact that hospital norms regarding early initiation did not change.

Multimedia Campaigns

Promoting early initiation and other breastfeeding practices in the mass media can influence mothers' behavior and may help to supplement training of health workers. Only two studies featured mass media promotion of early initiation.

- **Jordan.** In Jordan the Noor al Hussein Foundation held a seminar on breastfeeding policy, promotion and practices for 130 health professionals and conducted two mass media campaigns using daily radio and TV spots to promote early initiation, feeding of colostrum, and exclusive

breastfeeding. The proportion of mothers initiating breastfeeding within six hours after birth increased from 40 percent in 1988 to 54 percent in 1990. Media exposure was a significant predictor of the increase in timely initiation after the campaign began. More mothers delivering at home and at public hospitals initiated breastfeeding within six hours after birth. No changes were found among women delivering at private hospitals. Private hospitals were more likely than public hospitals to separate infants from mothers for the first six hours after birth and to give infants liquids other than breastmilk (McDivitt et al., 1993). Hence, the mass media campaigns in Jordan had less impact in settings where policies inhibited early initiation.

- **Armenia.** A one-month national media campaign in Armenia used radio and TV spots, newspaper advertisements and brochures to promote breastfeeding. Despite its brevity, the campaign appears to have had an impact on early initiation. A 1993 survey found that 12 percent of the mothers initiated breastfeeding within six hours after delivery. Following the campaign, a 1994 convenience sample found that 73 percent of the 37 women interviewed had initiated breastfeeding within six hours after delivery (Holley-Newsome, 1995). This study's serious methodological weaknesses preclude drawing any firm conclusions about the impact of a mass media campaign on early initiation. Nevertheless, the results warrant further exploration on use of mass media in breastfeeding promotion.

These studies suggest that the mass media may be useful in educating mothers on optimal breastfeeding practices and establishing or reinforcing normative behaviors. The Jordan study (McDivitt et al., 1993) shows that interventions to change hospital policies are also needed to ensure that women have the opportunity to implement recommended practices.

Women's Groups

Only one study examined the role of women's groups in promoting early initiation.

- **India.** In a study conducted in 10 villages in Haryana, India, members of 12 women's groups participated in a one-week training course on maternal and child health problems. Group members as well as local health workers and community development workers attended weekly educational sessions for about a year. Members volunteered to contact ten to 20 households to promote improved health practices. A post-intervention survey of women in the ten villages found that 60 percent of the mothers had begun breastfeeding immediately after birth or on the same day they gave birth, compared with 23 percent of the mothers surveyed before the intervention (Lal et al., 1992). Given the fact that early initiation was only one of many messages presented to the group, the substantial increase in early initiation suggests that group education may be an effective way to change breastfeeding initiation practices in situations where most births take place at home.

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Table 1. Early Initiation: Summary of Interventions and Benefits

			INTERVENTIONS									
Reference	**Country**	**Study Design**	**Prenatal Education**	**Hospital Policies/ Actions**	**Health Worker Training**	**Peer Counseling**	**Mass Media**	**Women's Groups**	**Home Visits**	**Community Educ.**	**Post-partum Clinics**	**Beneficial?**
Langer et al., 1996	Mexico	A				✓						No
Sanghvi, 1995	Brazil	B		✓								Yes
Valdés et al., 1993	Chile	B	✓	✓	✓							Yes
Prasad & Costello, 1995	India	B			✓							Yes
Gerung, 1989	Indonesia	B		✓	✓							Yes
Vandale-Toney et al., 1992	Mexico	B		✓	✓							No
Righard & Alade, 1990	Sweden	B		✓								Yes
Kistin et al., 1994	USA	B				✓						Yes
Holley-Newsome, 1995	Armenia	C					✓					Possibly
Popkin et al., 1991	Honduras	C		✓	✓							Yes
Lal et al., 1992	India	C						✓				Yes
McDivitt et al., 1993	Jordan	C					✓					Yes
Bradley & Meme, 1992	Kenya	C		✓	✓							Yes
Huffman, 1991	Panama	C		✓	✓							Yes

III. Interventions to Promote Feeding of Colostrum

Programs often incorporate colostrum feeding as part of the messages associated with breastfeeding initiation. The major interventions used to promote feeding of colostrum are training health workers to refute negative cultural norms regarding colostrum and changing hospital practices to support rooming-in and avoidance of prelacteal feedings and the disposal of colostrum. Some programs have used mass media and community education to influence norms regarding colostrum feeding.

Most of the studies described in the previous section on Early Initiation of Breastfeeding also entailed feeding of colostrum, since infants who are breastfed within a few hours of delivery receive colostrum. Nevertheless, studies included in this section are limited to those in which feeding colostrum is mentioned as an explicit goal or outcome of the intervention.

Only nine of the studies reviewed dealt with interventions to encourage feeding of colostrum. Of these, five studies focused on changing hospital policies and/or training hospital workers. Two studies used mass media in conjunction with peer counselors or community education; one study focused on prenatal education and another on women's groups (see Tables 2, page 12, and 6, pages 47-49).

Changing Hospital Practices and Training Hospital Workers

Two intervention studies covered the combination of changing hospital policies and training hospital workers, while three studies dealt with only one of these interventions. All studies found these interventions to be beneficial. Four of these studies are described below. The fifth study (Gerung, 1989) is discussed in Sections II and III.

- **Philippines.** Changing hospital policies led to a doubling in the proportion of newborns being breastfed in hospital, according to a study in the Philippines. The Baguio General Hospital and Medical Center previously confined newborns to nurseries, imposed an eight to 12-hour starvation period after birth, and then fed formula by bottles. In 1975 it changed its policies to supporting rooming-in and breastfeeding on demand and limiting the starvation period to two hours. Clinic records for the two years following the policy change indicated that the proportion of newborns who were breastfed in hospital rose to 87 percent, compared with 40 percent prior to the change (Clavano, 1982).
- **India.** In a government district hospital in Hajipur, Bihar, the nearly universal practice of giving prelacteal feeds to newborns fell dramatically after maternity ward workers provided new mothers with information about the avoidance of prelacteal feeds and the benefits of colostrum. Of those mothers delivering at the hospital who received the information, 43 percent used prelacteal feeds, compared with 96 percent of those who did not receive any information (Prasad and Costello, 1995).

Two studies did follow-up surveys of hospital-based health workers who had received training in lactation management:

- **Chile.** In Santiago, Chile, maternity ward staff were interviewed two years after they had taken a three-day course on lactation management. They reported that the practice of infants receiving colostrum as their first feeding increased from 75 percent before the course to 91 percent after the course (Valdés, 1994).
- **Kenya.** In Kenya, the MOH instituted a breastfeeding promotion program that included training of health workers and a directive to hospitals to stop routine prelacteal feedings so that colostrum rather than prelacteal foods would be a baby's first feedings. After the program's implementation, the proportion of health workers reporting use of prelacteal feeds as the norm dropped from the pre-program level of

93 percent to 48 percent (Bradley and Meme, 1992).

While these measurements may be based more on health workers' perceptions than on the actual behavior of mothers, they do indicate general trends favorable to colostrum feeding.

Prenatal Education

Only one study dealt with prenatal education to educate mothers on colostrum feeding.

- **India.** In Karnataka State, India, the University of Agricultural Sciences provided information about breastfeeding to expectant mothers with at least five years of education who had not fed colostrum to their previous child or children. In an experimental study, 120 mothers were randomly assigned to one of three groups: (1) a group that attended three lectures at the antenatal clinic, with a ten-minute discussion; (2) a group that received three pamphlets mailed to their home prior to delivery; and (3) a control group, which did not receive any education. Infants were fed colostrum exclusively by 33 percent of mothers who attended the lectures, 43 percent of those who received the pamphlets and none of those in the control group (Tamagond and Saroja, 1992). This study suggests that a relatively small amount of information provided through a single source (group lectures or print material) can influence educated mothers to counter the cultural norm of not feeding colostrum. Similar approaches need to be tested with other audiences to determine their effectiveness.

Women's Groups

Only one study documented the effect of women's groups on feeding of colostrum. This study, based on Freedom from Hunger's Education with Credit model, links income generation with education on health and nutrition. This approach is designed to promote sustainability: loan recovery rates are high, and most projects fully recover their operating costs within three to five years.

- **Ghana.** In Ghana, the Freedom from Hunger project organized self-managed credit associations for rural women. The associations receive small loans of under $300 and hold weekly education sessions on health and nutrition topics, including the benefits of colostrum and exclusive breastfeeding. Between 1993 and 1996, the proportion of program participants who gave their newborns colostrum increased from 60 percent to 96 percent, compared with an increase of 61 percent to 71 percent among mothers in the control group, who were living in villages with no credit programs. Women who participated in the program tended to introduce water and watery foods significantly later than those in control areas. The mean age at which mothers introduced water increased from seven days to 125 days among participating mothers compared with an increase from six days to 51 days among those in the control group (MkNelly, 1997).

This study suggests that income generation groups may be effective vehicles for breastfeeding education and support. The structure and content of these groups differs from the mother-to-mother support groups organized using La Leche League's model. In the Credit with Education model, membership is relatively stable because the participants are members of the credit association. An outside credit manager serves as group facilitator. He/she is trained to promote discussion and group problem-solving to deal with a wide range of issues, including breastfeeding and other child health topics. Programs are expanded by forming more associations and training more credit managers.

In traditional La Leche League groups, membership fluctuates. Groups are held together by their common situation (pregnancy and/or child rearing). A methodol-

ogy of group facilitation fosters discussion and group problem-solving focused on pregnancy, childbirth, reproductive health, and child rearing issues, including infant nutrition and care. Sustainability arises not from the stability of the participants, who may be different from meeting to meeting, but from a core of experienced mothers who reach out to an ever-widening circle of new mothers and continually transmit the skills needed to carry on the methodology and form new groups.

Multimedia Campaigns

Reports of multimedia campaigns indicate that colostrum feeding is typically a secondary message or is subsumed under the promotion of early initiation of breastfeeding. Two studies linked mass media and interpersonal channels in promoting feeding of colostrum:

- **Indonesia.** In Indonesia, the Ministry of Health's Weaning Project provided nutrition education to rural and semi-urban mothers in East Java and West Nusa Tenggara through village volunteers at health posts, radio spots, audio cassette tapes, posters, counseling cards and a leaflet. A survey of women in villages with nutrition education found that 50 percent of the mothers fed colostrum, compared with 38 percent among those in control villages. Of those mothers exposed to the project materials, 63 percent fed colostrum (Griffiths, 1991; Zeitlin et al., 1989).
- **Mali.** In four regions of Mali, the MOH nutrition education program promoted specific child feeding behaviors, including feeding colostrum. Channels used by local non-governmental organizations (NGOs) and international private voluntary organizations (PVOs) were individual counseling and group education by field workers, village meetings, a radio drama and spots, a village story book, health cards, guides for teachers and field workers, and literacy booklets. After the project had been implemented over a four-year period, 58 percent of women in the intervention villages fed colostrum, compared with 42 percent of those in the control villages (Gottert, 1995).

These findings suggest that changing norms regarding colostrum feeding is feasible, even when colostrum messages are provided as part of a larger infant feeding campaign.

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Table 2. Feeding of Colostrum: Summary of Interventions and Benefits

Reference	Country	Study Design	INTERVENTIONS									Beneficial?
			Prenatal Educ.	Hospital Policies/ Actions	Health Worker Training	Peer Counseling	Mass Media	Women's Groups	Home Visits	Community Educ.	Post-partum Clinics	
MkNelly, 1997	Ghana	A						✓				Yes
Griffiths, 1991; Zeitlin et al., 1989	Indonesia	A				✓	✓					Yes
Gottert, 1995; Ross, 1997	Mali	A					✓			✓		Yes
Prasad & Costello, 1995	India	B			✓							Yes
Tamagond & Saroja, 1992	India	B	✓									Yes
Gerung, 1989	Indonesia	B		✓	✓							Yes
Valdés et al., 1994	Chile	C			✓							Yes
Bradley & Meme, 1992	Kenya	C		✓	✓							Yes
Clavano, 1982	Philippines	C		✓								Yes

IV. Interventions to Promote Exclusive Breastfeeding

Exclusive breastfeeding for the first six months is a complex behavior involving multiple points of intervention. Mothers must decide initially to breastfeed and learn the correct techniques. They need to persevere when difficulties arise, and sometimes they must counter cultural norms and advice from people they respect regarding supplemental feeding. Information and counseling throughout this sequence of behaviors can keep mothers on track to reach the goal of six months of exclusive breastfeeding. Research studies show that various types of interventions can contribute toward this outcome. An ideal mix of interventions, or even a menu of cost-effective approaches, has not yet been identified and probably varies with the setting.

Thirty-five intervention studies that promote exclusive breastfeeding were identified (see Table 3, pages 23-25, and Table 7, pages 50-60). The most common interventions studied were changes in hospital policies/actions and training hospital workers. Eighteen studies included one or both of these interventions. Ten studies looked at peer counseling. Prenatal education, mass media, and home visits each had seven studies. Six studies dealt with community education, and four studies examined the effects of women's groups. (Most studies had a combination of interventions.) The following sections discuss studies pertaining to the various approaches used.

Combinations of Interventions

Most studies combined several types of interventions, making it impossible to determine which ones were most effective. Nevertheless, these studies do demonstrate that providing multiple services and reaching women at different times (e.g. pregnancy, soon after delivery, and during the first six postpartum months) do lead to significant changes in exclusive breastfeeding. Following are summaries of five studies that provided a variety of interventions:

- **Radio and television programs and spots, training of health workers and primary school teachers, changes in hospital policies, restriction of formula distribution, and women's support groups**. Beginning in 1981, the Ministry of Health and other government ministries in Brazil launched a large-scale national breastfeeding promotion campaign. Intensive media coverage helped to create a high profile for various breastfeeding interventions, including training of health workers and primary school teachers, changing hospital policies such as rooming-in, restricting formula distribution, counseling mothers, and organizing mothers' support groups. Surveys done in greater São Paulo found that, although fewer infants under one-month-old were exclusively breastfed after the campaign (74 percent in 1981, and 53 percent in 1987), more infants at older ages were exclusively breastfed (of infants two months old, 24 percent in 1981 and 44 percent in 1987; of those four months old, 4 percent in 1981 and 39 percent in 1987; and those six months old, 11 percent in 1981 and 37 percent in 1987). Also, the mean duration of exclusive breastfeeding increased from 43 days in 1981 to 67 days in 1987 (Rea and Berquó, 1990).
- **Training health workers, prenatal education, improved hospital practices and a lactation clinic**. A study in Santiago, Chile looked at the effects of five breastfeeding interventions—training of health providers, prenatal education, hospital activities, changes in hospital policies, and an outpatient breastfeeding support clinic. This combination of interventions increased the proportion of infants exclusively breastfed. At six months of age, 67 percent of the infants in the intervention group were exclusively breastfed,

compared with 32 percent among those in the control group (Valdés, 1993; Pérez and Valdés, 1991).

- **Postnatal clinic check-ups, home visits, and workshops led by peer educators**. A study in Chile found that frequent postnatal clinic check-ups, home visits by peer educators, and workshops led by peer educators increased the prevalence and duration of exclusive breastfeeding. The study subjects were low-income women delivering in hospital and living in two areas with similar socio-economic characteristics. The control group received four clinic visits during the first six months postpartum for routine pediatric care. The intervention group received (1) eight clinic visits during this period, (2) home visits by peer educators during the last three months of pregnancy and in the hospital post-delivery, and (3) two-hour workshops led by peer educators, attended twice during pregnancy and monthly during the first six months postpartum. Among the control group, exclusive breastfeeding fell off rapidly after the first months. Seventy-six percent of the infants were being exclusively breastfed at one month of age, eight percent at four months of age, and none at six months of age. Among the intervention group, 100 percent of the infants were exclusively breastfed at one month of age, 90 percent at four months of age, and 42 percent at six months of age (Alvarado et al., 1996).
- **Prenatal education, postnatal clinic visits, home visits, and peer counseling**. In Chile, a demonstration project promoted "exclusive" breastfeeding (which the researchers defined as breastfeeding and water) to low- and middle-income urban women during the first three months postpartum through five interventions: (1) a series of four lectures in the prenatal clinic, (2) infant growth monitoring and counseling of mothers during their monthly postnatal visits, (3) eight home visits, (4) counseling on how to continue exclusive breastfeeding and assistance in returning to exclusive breastfeeding, and (5) peer group encouragement. Three groups of infants were studied: one before the intervention, another in the first four months of the intervention, and another one year after it had been implemented. At one month postpartum, 85 percent of the infants in the pre-intervention group were "exclusively" breastfed (breastmilk and water), compared with 95 percent of those in the first post-intervention group and 87 percent in the second post-intervention group. By six months of age, these proportions fell to 30 percent, 74 percent and 61 percent, respectively (Burkhalter and Marin, 1991). This project, therefore, raised levels of "exclusive" breastfeeding (breastmilk and water).
- **Changes in hospital policies and practices, training of hospital workers, community education, mothers' support groups, and postnatal care at health post linked with child care centers**. In Mexico the Ministry of Health implemented the Baby- and Mother-Friendly Hospital Initiative on a national basis in 1991. The infant formula manufacturers agreed to stop giving infant formula samples to public and private hospitals. Other actions included extensive training of health workers, distribution of community education materials, follow-up by health professionals working in hospitals, and creation of mothers' support groups. In 1995 IMSS, the Social Security Institute, established a system for postnatal follow-up by linking primary health care posts with child care facilities. Among infants seen at 38 health posts in Mexico City and nine in Veracruz Norte, the prevalence of exclusive breastfeeding among newborns rose from 44 percent in 1991 to 48 percent in 1993 and 74 percent in 1995. Median duration of exclusive breastfeeding was 0.6 months in 1991, 1.0 months in 1993 and 1.1 months in 1995 (IMSS, no date). It appears that the combination of policy

changes and program initiatives improved initial rates of exclusive breastfeeding, although further improvements in extending the duration of exclusive breastfeeding are needed.

Changes in Hospital Practices/Training of Hospital Workers

The same hospital practices and actions that influence early initiation and feeding of colostrum—rooming-in, early mother-infant contact and avoidance of prelacteal feeds—are important to exclusive breastfeeding, at least for the first weeks postpartum. Of the eight studies that focused mainly on changes in hospital practices and training hospital workers, seven studies found that these interventions increased the prevalence or duration of exclusive breastfeeding:

- **Brazil.** In Santos, Brazil, the University of Campinas did a study on the effectiveness of an active hospital-based breastfeeding promotion program on exclusive breastfeeding among low-income urban women. The program included rooming-in, early initiation of breastfeeding, assistance in breastfeeding, and talks providing information on exclusive breastfeeding for the first six months of life, how to solve common breastfeeding problems, and where to find postpartum breastfeeding help. A nearby hospital with no breastfeeding program except rooming-in and prohibition of free gifts of infant formula, served as the control. Women who delivered in the hospital with the active breastfeeding promotion breastfed exclusively for an average of 75 days, compared with 22 days among those in the control hospital (Lutter et al., 1997).
- **India.** In India, Sion Hospital, located in the slums of Bombay, changed its policies in the early 1980s to be more supportive of breastfeeding. It banned infant formula and bottles, trained its staff, adopted rooming-in, and established a Human Milk Bank. These changes appear to have had long-term effects on exclusive breastfeeding. In 1980, 97 percent of infants delivered at the hospital were exclusively breastfed at birth, 74 percent at three months, and 45 percent at six months. A decade later, 1,990 hospital records indicate that 100 percent of infants were exclusively breastfed at birth, 95 percent at three months, and 88 percent at six months (Wellstart International, 1998).
- **Indonesia.** A hospital in rural Indonesia changed its procedures to ensure that newborns were immediately put to the mother's breast and that prelacteal feedings were discontinued. (Rooming-in was already practiced.) These changes resulted in an immediate increase in exclusive breastfeeding of newborns at hospital discharge, from 61 percent in the three months prior to the intervention to 94 percent in the three months following implementation (Gerung, 1989).
- **Mexico.** In Mexico City a large hospital adopted a new breastfeeding program that included staff training in lactation management, promotion of early initiation, classes for first-time mothers, individual guidance in lactation management and limitations on bottle feeding. The new program had no significant impact on exclusive breastfeeding. At one month postpartum, 38 percent of the first-time mothers who delivered after the program went into effect were exclusively breastfeeding, compared with 34 percent of the first-time mothers who delivered before the program was instituted (Vandale-Toney et al., 1992).
- **Nicaragua.** In Nicaragua, a study found that 63 percent of the mothers who had rooming-in and received breastfeeding promotion messages were exclusively breastfeeding at one week postpartum. The rate was 53 percent among mothers who had contact with their infants for 45 minutes after delivery, followed by 12 to 24 hours' separation (until discharge), and had received breastfeeding promotion messages. The rate dropped to 32 percent among those who were

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completely separated from their infants during their entire 12 to 24-hour hospital stay and received no breastfeeding promotion messages. However, at four months postpartum, there was no statistically significant difference in exclusive breastfeeding among the three groups (Strachan-Lindenberg et al., 1990). Thus the early mother-infant contact was beneficial at one week postpartum, but not at four months postpartum.

- **Panama.** In the Coclé region of Panama, the regional health office trained more than 2,000 health workers. Penonome Hospital, which had previously separated mothers and their newborns for 24 hours after delivery (until hospital discharge) and routinely fed newborns water and formula, changed its policies to reduce the duration of mother-infant separation, shift to rooming-in, and stop giving newborns water and formula. In 1984 (before these changes), 30 percent of infants aged two to four months were exclusively breastfed. By 1986 this proportion had risen to 57 percent of infants in this age group (Huffman, 1991).
- **Peru.** In Lima, Peru staff of two hospitals received a 20-hour course on breastfeeding techniques and counseling. They also received educational materials, including a pocket reference guide, flip chart, and poster/calendar. At the hospital with the most complete and intensive educational program, rates of exclusive breastfeeding at two weeks (62 percent) and 12 weeks postpartum (52 percent) were higher than at the other intervention hospital (35 and 17 percent, respectively), which in turn was higher than at the control hospital (20 and 8 percent, respectively) (Nutrition Communication Project, 1995b; Altobelli, 1993).
- **Norway.** In Norway, the mean duration of exclusive breastfeeding was 4.5 months among newborns who had received early, frequent and unsupplemented breastfeeding during their hospital stay, compared with 3.5 months among those in a control group studied before hospital routines were changed (Nylander et al., 1991).

These studies suggest that changes in hospital practices and training of hospital workers have their greatest impact during the first few weeks after delivery. Of the four studies that measured impact at three months or more postpartum, three (in India, Peru, and Norway) reported higher prevalence or longer duration of exclusive breastfeeding, while one (in Nicaragua) reported no difference. The study in Mexico found no difference at one month postpartum. In cultures where early supplementation is the norm, programs that provide guidance to mothers at the time of delivery may need to be supplemented by follow-up during the early postpartum months in order to reinforce the message about the importance of exclusive breastfeeding.

Two additional studies reported on the impact of in-hospital education on exclusive breastfeeding rates.

- **Turkey.** A study in Istanbul, Turkey used a combination of in-hospital education and home visits in the first week postpartum to promote exclusive breastfeeding. In hospital new mothers viewed a film and attended a 40-minute educational session on breastfeeding. On the fifth to seventh day postpartum, health workers visited them at home for a 20 to 30 minute educational session on breastfeeding. Among women who received the special breastfeeding education, 47 percent were exclusively breastfeeding in the first week after delivery and 16 percent were still exclusively breastfeeding in the first month postpartum. In contrast, of the women who received education only on oral rehydration therapy, 12 percent were exclusively breastfeeding in the first week after delivery and four percent were still exclusively breastfeeding in the first month postpartum. However, the benefits of the education did not extend beyond the

first two months. By the third month postpartum there was no significant difference in the proportion breastfeeding (Neyzi et al., 1988; Neyzi et al., 1991a). This study did not examine whether the education in hospital or at home was more effective. Its finding that the impact of the interventions wore off by the third month postpartum is consistent with the studies previously reported.

- **Bangladesh.** A study in Bangladesh demonstrated that exclusive breastfeeding can be restored when partially breastfeeding mothers are provided with appropriate counseling and education. The International Centre for Diarrhoeal Disease Research conducted an experimental study to provide breastfeeding counseling to mothers of infants under 12 weeks old, who were admitted to the hospital due to diarrhea. Mothers of infants admitted to hospital due to diarrhea are an important audience for breastfeeding education, since these infants are often partially breastfed and thus at high risk of illness from other food sources. The mothers, who were partially breastfeeding, were randomly assigned to a control group or a group that received three individual counseling sessions on exclusive breastfeeding and two weekly home visits after hospital discharge. Of the control group, six percent of mothers were breastfeeding exclusively at discharge and eight percent two weeks after discharge, compared with 60 percent of the mothers in the intervention group at discharge and 75 percent two weeks after discharge (Haider et al., 1996).

Prenatal Education

Five studies reviewed include prenatal education in a package of interventions designed to influence exclusive breastfeeding (Alvarado et al., 1996/Chile; Burkhalter and Marin, 1991/Chile; Valdés et al., 1993/Chile; Morrow et al., 1996/Mexico; and Rodriguez-Garcia et al., 1990/Mexico). Because the effects of prenatal education cannot be separated from the other interventions, these studies are discussed in other sections.

Only three studies—one in Chile and two in the U.S.A.—were identified that tested prenatal education as a separate intervention:

- **Chile.** In Santiago, Chile, the Clinical Hospital of Catholic University studied a subsample of 59 women who received extra prenatal education in addition to the five breastfeeding interventions reported in the larger study (Valdés et al., 1993; Perez & Valdés, 1991). Breastfeeding education during prenatal visits was one of the five interventions. The extra prenatal education consisted of between one and three group education sessions on breastfeeding skills. Of the women who attended these sessions, 80 percent were fully breastfeeding (breastmilk plus no more than one two-ounce supplement per week) at six months postpartum, compared with 65 percent among those who received only the other five interventions and 32 percent among those in the control group (Pugin et al., 1996).
- **United States.** In Flagstaff, Arizona, U.S.A., low-income women were offered incentives to attend a prenatal breastfeeding course and an extra two-hour class. The mother received baby supplies and a free breast pump. Prizes were raffled to mothers who reported exclusive or partial breastfeeding. Partners were encouraged to participate and received tickets to a football game. At hospital discharge (assumed to be about two days postpartum), 89 percent of the women in the intervention group were exclusively breastfeeding, compared with 55 percent of those in the control group who were informed of childbirth preparation classes and breastfeeding promotion activities but received no encouragement to attend. At three months postpartum, 42 percent of the intervention group were exclusively breastfeeding, compared with 17 per-

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cent of those in the control group (Sciacca et al., 1995).

- **United States.** A study in Columbus, Ohio, U.S.A. found that women who attended a prenatal course on breastfeeding were more likely to be "totally" breastfeeding at one month postpartum and had a more positive view of their infant than those who did not attend such a course (Wiles, 1984). The "total" breastfeeding rate at one month postpartum was 90 percent for course participants compared with 30 percent for non-attenders.

All three studies found that more extensive prenatal education was associated with higher prevalence of exclusive breastfeeding. The effect was measured at different times (Chile at six months postpartum, Arizona, U.S.A. at three months and Ohio, U.S.A. at one month).

Psycho-social Support during Delivery

Two studies examined the possible benefits of having other women present during delivery to provide psycho-social support:

- **Mexico.** In a Mexico study, paid *doulas*, mainly retired nurses, assisted first-time mothers during labor and delivery and visited them in the maternity ward to discuss breastfeeding techniques. At one month postpartum, 12 percent of the intervention group were exclusively breastfeeding, compared with seven percent of the control group. This difference is statistically significant (Langer et al., 1996).
- **South Africa.** A study in South Africa recruited women volunteers from the community to provide emotional support to first-time mothers during labor and delivery. The volunteer "labor companions" conveyed no information about breastfeeding. They had no health training, did not discuss breastfeeding, and did not visit the subjects in the postnatal wards. Thus no information or counseling on breastfeeding was provided. The first-time mothers who had been assisted by the volunteers were more likely to be exclusively breastfeeding at six weeks postpartum and less likely to be having breastfeeding problems, compared with those in the control group, who had no such assistance. The exclusive breastfeeding rate was 51 percent for the former group and 29 percent for the latter (Hofmeyr et al., 1991).

These studies suggest that support during labor and delivery is beneficial to women and appears to lead to higher rates of exclusive breastfeeding. In the Mexico study, the *doulas* were more similar to health workers in background and social status and thus should not be described as peer counselors. The researchers wanted to ensure that the hospital would hire them as regular employees and hence did not recruit peers from the community. The researchers concluded that the *doulas* provided many benefits and would be a cost-effective addition to the hospital staff (Langer et al., 1996). The South Africa study is interesting because the volunteers did not mention breastfeeding and did not see the mothers after delivery, and yet they had an impact on exclusive breastfeeding at six weeks postpartum. The emotional support evidently gave these first-time mothers greater confidence than those who had no such assistance, and this confidence helped them to persist in breastfeeding. (Hofmeyr et al., 1991).

Commercial Discharge Packs

Many hospitals provide discharge packs prepared by infant formula companies. Some of these packs contain infant formula, while others have only leaflets promoting infant formula and bottle-feeding supplies. Several researchers have explored the effect on exclusive breastfeeding of providing "non-commercial" discharge packs that promote only breastfeeding.

The five studies on the effect of commercial discharge packs were done in the United States or Canada. A review of these studies concluded that "commercial

discharge packs are linked to poor lactation success, particularly among vulnerable subgroups such as primiparae [first-time mothers] and poor women in developing countries." (Pérez-Escamilla et al., 1994, p. 91-92). Results of two of the five studies are as follows:

- **United States.** In a study in Iowa City, Iowa, U.S.A., women who received a discharge pack containing a manual breast pump, breast pads, and cream continued exclusive breastfeeding for an average of 4.2 weeks postpartum, compared with 2.8 weeks among those who received a commercially available discharge pack containing infant formula (Dungy, 1992).
- **United States.** A study in Boston, Massachusetts, U.S.A., found that women who received a discharge pack with educational pamphlets about breastfeeding plus breast pads were more likely to be exclusively breastfeeding at four months postpartum than those who received a commercial pack with formula advertisements, two bottles of water, and two nipples (Frank et al., 1987).

Thus, it appears that commercial discharge packs, whether or not they contain formula samples, lead to shorter duration of breastfeeding than non-commercial packs that promote only breastfeeding.

Postpartum Guidance by Health Workers, Lactation Centers, and Clinic Visits

Several studies included postpartum follow-up by health workers, either through visits to MCH clinics or lactation centers, home visits, and telephone calls. Three studies used follow-up by health workers as their main intervention:

- **Chile.** In a 1993-95 study in Santiago, Chile, health workers counseled low- and middle-class urban women who were exclusively breastfeeding at 30 days postpartum and planned to return to work before 120 days postpartum. The women were counseled on their individual situation and taught hand expression to enable them to continue to breastfeed while working outside their homes. The women also attended monthly clinical visits for the first six months postpartum. At six months postpartum, 54 percent of these women were breastfeeding exclusively, compared with only six percent of those who received routine pediatric care and monthly follow-up telephone calls (Valdés, 1996).
- **Turkey.** A study in Turkey of middle-income women delivering in an urban social security hospital made progress in increasing the proportion of infants exclusively breastfed up to four months of age. Mothers received appointment cards to bring their two-week-old babies to the pediatric hospital for well-baby care. They were asked to make monthly visits during the next four months, and a physician spent five to 15 minutes during each visit discussing breastfeeding. The control group received routine follow-up. At one week postpartum, only 47 percent of the infants in both groups were being exclusively breastfed. At two months postpartum, 17 percent of infants in the intervention group and four percent of those in the control group were exclusively breastfed, and by four months postpartum this proportion fell to five percent of the intervention group and less than one percent of the control group (Neyzi et al., 1991b).
- **United States.** A study in Boston, Mass., U.S.A. found that women who received individual counseling in the hospital plus eight telephone calls up to 12 weeks postpartum were more likely to delay introduction of solid foods than those without postpartum follow-up, but they were not more likely to be exclusively breastfeeding at four months postpartum (Frank et al., 1987). The counseling and telephone follow-up may have had no effect on breastfeeding because the hospital was already doing

breastfeeding promotion and offered print materials and a breastfeeding hotline.

The more frequent clinic visits in the Chile and Turkey studies helped to address traditional practices of early introduction of liquids and thus extended the duration of exclusive breastfeeding. The lack of impact seen in the U.S. study using individual counseling and telephone follow-up may be due to the fact that the U.S. women had alternative information sources and the intervention did not counter structural constraints such as workplace requirements or other factors such as social norms.

- **Brazil.** The only study that had lactation centers as its sole intervention was one from Brazil. The Universidade Federal de Pelotas, São Paulo state, did a longitudinal study of infants from birth up to the age of six months. Mothers of all infants were referred to two lactation centers in the first week after hospital discharge. Infants who had been taken to a lactation center by four months of age were considered to be the intervention group, while those who did not go to a center served as the control group. The centers provided individual counseling, group consultations and assistance with specific breastfeeding problems. Among infants in the intervention group, 55 percent were exclusively breastfed at one month postpartum, 43 percent at four months, and 15 percent at six months. In contrast, 31 percent of infants in the control group were exclusively breastfed at one month postpartum, 18 percent at four months, and six percent at six months. Infants who had attended a center more frequently than others had better breastfeeding patterns: 23 percent of those attending five or more times were exclusively breastfed at six months of age (Barros et al., 1995). Although lactation centers may have been beneficial, the observed differences in exclusive breastfeeding rates may also be attributable to higher levels of self-motivation among mothers who chose to attend than among those who did not attend.

Peer Counseling and Women's Groups

Three studies that focused on home visits and other contacts by peer counselors reported higher rates of exclusive breastfeeding after the interventions:

- **Mexico.** A 1995-96 study in Mexico, conducted by the National Institute of Nutrition and La Leche League of Mexico, found a dose-response effect between the number of home visits by a peer counselor and the duration of exclusive breastfeeding. At three months postpartum, 48 percent of the mothers visited six times by a peer counselor (twice during pregnancy, immediately after delivery, and at two, four, and eight weeks postpartum) were exclusively breastfeeding, compared with 33 percent of those visited three times (at the end of pregnancy, immediately after delivery, and at two weeks postpartum) and seven percent among mothers who were in the control group and were not visited (Morrow et al., 1996).
- **Mexico.** In another study in Mexico, FEMAP, a federation of private family planning agencies, trained volunteer health promoters in breastfeeding promotion and lactation management. The promoters instructed pregnant women in breastfeeding, visited each mother at least twice monthly for the first six months postpartum, held group classes on breastfeeding in their homes, and gave out print materials. In the three low-income communities that served as intervention sites, 71 percent of infants were exclusively breastfed in the first month postpartum, 14 percent in the fifth month, and 9 percent in the sixth month. In the control community, 63 percent of infants were exclusively breastfed in the first month postpartum, 15 percent in the fifth month, and three percent in the sixth month (Rodriguez-Garcia et al., 1990).

- **United States.** In Chicago, Illinois, U.S.A. Cook County Hospital promoted exclusive breastfeeding among low-income urban women using volunteer peer counselors, who talked with women either by telephone or in person before delivery, at least twice weekly until breastfeeding was established, every one to two weeks for the next two months, and then as needed. The study found that women in the counseling group were more likely to be exclusively breastfeeding at 12 weeks postpartum than controls (29 percent compared with seven percent) (Kistin et al., 1994).

The National Institute of Medicine/La Leche League of Mexico study and the U.S. study found that the volunteer peer counselors helped to raise rates of exclusive breastfeeding in the first three months postpartum, while the FEMAP/Mexico study reported an impact in the first month postpartum, but this effect had disappeared by the fifth month postpartum. These findings suggest that the peer counselors were helpful in the early months in prolonging exclusive breastfeeding despite community norms favoring early supplementation.

Although many countries have mothers' support groups, few such groups have been systematically studied. This review found only three studies—all from Central America—that document the impact of mothers' support groups:

- **Guatemala.** La Leche League of Guatemala sought to increase exclusive breastfeeding among low-income mothers in 17 peri-urban communities. It recruited and trained volunteer breastfeeding advocates, who formed mother-to-mother support groups based on the La Leche League model. The volunteers held group meetings and provided educational materials. In one community, exclusive breastfeeding increased from 16 percent in 1990 (before the intervention) to 22 percent in 1992 (after the groups had been in place for a year) among infants under four months and from ten percent to 18 percent among those under six months (Stone-Jiménez and de Maza, 1993).
- **Honduras.** La Leche League of Honduras also worked with low-income, urban mothers, using individual counseling and mothers' support group meetings led by a peer counselor. Communities in the city of San Pedro Sula were assigned to control or intervention groups. After 12 months of project activities, no significant differences in the prevalence and duration of exclusive breastfeeding were observed. The major reason offered for this result is that the intervention had poor coverage. Only 12 percent of mothers of infants had any contact with the peer counselors, and only seven percent attended a support group meeting. However, mothers of infants under six months old who had contact with the peer counselor breastfed exclusively for an average of 9.6 weeks, compared with 4.3 weeks among mothers in the control group (Rivera et al., 1993).
- **Honduras.** Another study in Honduras studied the impact of monthly meetings and home visits. A private organization, AHLACMA, trained volunteer peer counselors in 20 rural communities. The peer counselors organized monthly meetings for mothers to discuss problems and share information. Peer counselors also visited one to two mothers monthly in their homes. Women who participated in a group meeting or home visit by a peer counselor received more information about breastfeeding than the control group that received routine health education from community health educators and midwives. The prevalence of exclusive breastfeeding in the intervention group increased from 20 percent to 50 percent at two months postpartum and from nine percent to 31 percent at three months. The mean duration of exclusive breastfeeding in the intervention group increased from 1.22 months to 3.01 months, while the du-

ration among the control group declined during this period (AHLACMA et al., 1993).

All three studies reported increased rates of exclusive breastfeeding among mothers who had contact with the volunteer peer counselors, either in group meetings or through personal contact. The La Leche League of Honduras study raises the problem of coverage: finding and training adequate numbers of volunteers can be difficult. However, unless large numbers of mothers in the community have contact with the peer volunteers, overall prevalence of exclusive breastfeeding is unlikely to change.

Mass Media Campaigns and Community Education

Of the eight studies that included mass media and/or community education components, only two studies used these approaches as their main intervention:

- **Honduras.** In Honduras, a 1989-93 national multimedia campaign led to increases in exclusive breastfeeding among infants under six months of age. In the two regions studied, the prevalence of exclusive breastfeeding increased from 48 percent to 70 percent among infants one month old, from 24 percent to 31 percent among those aged four months, and from seven percent to 12 percent among those aged six months. More mothers were reached through the mass media campaign than by health workers, even though the health workers had received training in breastfeeding promotion. At least 59 percent of the mothers surveyed had seen a poster or other print material; 44 percent had heard the radio spots. Although 80 percent of the women said that they had received prenatal care at MOH facilities, only 23 to 41 percent had heard about breastfeeding from a health worker (Nutrition Communication Project, 1995a; Hernandez et al., 1995).
- **Peru.** In Peru, a 1991 to 1993 community education program in nine low-income urban communities reached nearly all (98 percent) of the mothers of infants through posters, loud speakers, booklets, courses, weaning food recipes, and radio. Among children zero to four months, the prevalence of exclusive breastfeeding rose from 33 percent to 43 percent (Creed-Kanashiro et al., 1994; Creed-Kanashiro et al., 1995).

In both of these studies, use of mass media linked to interpersonal channels increased the prevalence of exclusive breastfeeding. In the Honduras study, the mass media campaign helped to overcome weaknesses in the health delivery system by providing information to mothers with no access to health care as well as those who received little or no information about breastfeeding during routine health visits. In the Peru study, posters, booklets and radio were used to support the community education program, ensuring that messages were accurate and consistent.

- **Brazil.** Other studies, for example, one by Rea and Berquo in Brazil (1990), focus on the impact of national breastfeeding programs (and in particular mass media) on duration of breastfeeding and rates of exclusive breastfeeding. Because of methodological limitations with the Brazil study (including measurement of behaviors six years after the program was launched), it is not possible to draw definitive conclusions about the impact of mass media. However, trends suggest that mass media can have a positive impact on exclusive breastfeeding rates.

Table 3A. Exclusive Breastfeeding: Summary of Interventions and Benefits

Reference	Country	Study Design	INTERVENTIONS: Pre-natal Educ.	Hospital Policies/ Actions	Health Worker Training	Peer Coun-seling	Mass Media	Women's Groups	Home Visits	Community Educ.	Post-partum Clinics	Beneficial?
Haider et al., 1996	Bangladesh	A		✓					✓			Yes
Alvarado et al., 1996	Chile	A	✓	✓		✓					✓	Yes
AHLACMA, 1993	Honduras	A				✓		✓	✓			Yes
Rivera et al., 1993	Honduras	A				✓		✓				Yes for those reached
Gottert, 1995; Ross, 1997	Mali	A				✓	✓			✓		Yes
Langer et al., 1996	Mexico	A				✓						Slightly
NCP, 1995b; Altobelli, 1993	Peru	A		✓	✓		✓					Yes
Neyzi et al., 1988; Neyzi et al., 1991a	Turkey	A					✓		✓			Yes
Neyzi et al., 1991b	Turkey	A									✓	Yes
Waldenström & Nilsson, 1994	Sweden	A		✓								No
Dungy et al., 1992	U.S.A.	A		✓								Yes
Frank et al., 1989	U.S.A.	A		✓								Yes

Table 3B. Exclusive Breastfeeding: Summary of Interventions and Benefits

		INTERVENTIONS										
Reference	**Country**	**Study Design**	**Prenatal Educ.**	**Hospital Policies/ Actions**	**Health Worker Training**	**Peer Counseling**	**Mass Media**	**Women's Groups**	**Home Visits**	**Community Educ.**	**Post-partum Clinics**	**Beneficial?**
Barros et al., 1995	Brazil	B									✓	Yes
Lutter et al., 1997	Brazil	B		✓								Yes
Valdes et al., 1993; Perez & Valdes, 1991; Pugin et al., 1996	Chile	B	✓	✓	✓						✓	Yes
Valdés et al., 1996	Chile	B									✓	Yes
Manoff International, 1984	Indonesia	B					✓		✓	✓		Yes
Morrow et al., 1996	Mexico	B	✓						✓			Yes
Rodriguez-Garcia et al., 1990	Mexico	B	✓			✓						Yes
Vandale-Toney et al., 1992	Mexico	B		✓	✓							No
Strachan-Lindenberg et al., 1990	Nicaragua	B		✓								Yes, at 1 week post-partum
Hofmeyr et al., 1991	South Africa	B				✓						Yes
Kistin et al., 1994	U.S.A.	B				✓						Yes
Sciacca et al., 1995	U.S.A.	B	✓									Yes
Wiles, 1984	U.S.A.	B	✓									Yes

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Table 3C. Exclusive Breastfeeding: Summary of Interventions and Benefits

		INTERVENTIONS										
Reference	**Country**	**Study Design**	**Prenatal Educ.**	**Hospital Policies/ Actions**	**Health Worker Training**	**Peer Counseling**	**Mass Media**	**Women's Groups**	**Home Visits**	**Community Educ.**	**Post-partum Clinics**	**Beneficial?**
Rea & Berquó, 1990	Brazil	C		✓	✓		✓					Probably
Burkhalter & Marin, 1991	Chile	C	✓			✓			✓		✓	Yes
Stone-Jiménez & de Maza, 1993	Guatemala	C				✓		✓				Yes
NCP, 1995; Hernandez et al., 1995	Honduras	C			✓		✓					Yes
Popkin et al., 1991; Huffman et al., 1991	Honduras	C		✓	✓				✓			Yes
Wellstart International, 1998	India	C		✓	✓							Yes
IMSS, [no date]	Mexico	C		✓	✓		✓	✓			✓	Probably
Huffman, 1991	Panama	C		✓								Probably
Creed-Kanashiro et al., 1994 and 1995	Peru	C					✓			✓		Yes
Nylander et al., 1991	Norway	C		✓	✓							Yes

V. Interventions to Promote Continued Breastfeeding

Few infant feeding programs have adopted the goal of continued breastfeeding through the second year and beyond, and therefore there are few studies that examine the factors and interventions that lead to continued breastfeeding. Factors that are believed to influence continued breastfeeding are cultural norms, mothers' knowledge of the benefits of continued breastfeeding, the timing of the next pregnancy, the mother's self-confidence, employment outside the home and time demands. Only three studies cited outcome variables related to breastfeeding of infants older than six months. Three additional studies were included in this category because the goal of the interventions was to increase the duration of breastfeeding (see Table 4, page 28, and Table 8, pages 61-63). The six studies on continued breastfeeding are:

- **Guatemala.** The Guatemala study on the impact of mothers' support groups (previously cited in the exclusive breastfeeding section) found an increase in continued breastfeeding after these groups had been established. The proportion of children between 20 to 24 months who were still breastfeeding rose from 25 percent in 1990 to 28 percent in 1992 (Stone-Jiménez and de Maza, 1993). The study did not report whether this difference is statistically significant.
- **Honduras.** In Honduras, the PROALMA Project promoted improved breastfeeding practices through changes in hospital practices, visits to women in maternity wards and at home to treat breastfeeding problems, lactation clinics, educational talks in the community, and print materials. During the project, which was implemented from 1983 to 1989, the average duration of breastfeeding increased. These efforts were supported by a national mass communication project to improve infant health. National surveys found that the median duration of breastfeeding rose from about four months in 1981 to nine months in 1984 and ten months in 1987 (Popkin et al., 1991; Huffman et al., 1991).
- **Kenya.** In Kenya the government implemented a national, multi-pronged breastfeeding promotion program in 1982. It restricted infant formula sales, directed hospitals to change practices related to the feeding of newborns and mother-infant contact, and trained health workers in lactation management. According to national surveys the mean duration of breastfeeding increased from less than 14 months in 1979 to 19.4 months in 1989 (Bradley and Meme, 1992).
- **Mexico.** In Mexico City a large urban hospital adopted a new breastfeeding program that included staff training in lactation management, promotion of early initiation, classes for first-time mothers, individual guidance in lactation management and limitations on bottle feeding. The new program had a significant effect on the duration of breastfeeding. First-time mothers in the intervention group breastfed their infants for a median duration of 17 weeks, compared with 12 weeks among mothers who delivered before the program was instituted. Also, infants in the intervention group were healthier and had more weight gain than those born prior to the program (Vandale-Toney et al., 1992).
- **United Kingdom and Scotland.** In the U.K., Ninewells Hospital and the University of Dundee, Scotland, found that early initiation and frequent feeding soon after delivery led to longer duration of breastfeeding. First-time mothers who had chosen to breastfed were assigned to groups with early or late initiation and feeding every two or four hours in hospital. Mothers who initiated breastfeeding within ten minutes of delivery and breastfed every two hours in hospital breastfed for an average of 182 days, compared with 77 days among mothers who initiated breastfeeding four to six hours after

delivery and breastfed at four-hour intervals in hospital (Salariya et al., 1978).

- **United States.** In the U.S.A., a study in rural New Mexico examined the impact of breastfeeding counseling and support during the first two weeks postpartum on breastfeeding duration. Low-income women who delivered at the hospital were exposed to one or more of three interventions: a hospital visit one to three days postpartum to discuss breastfeeding, a telephone call or letter four to five days postpartum, and a structured group support class at two weeks postpartum. Among women who received all three interventions, 95 percent were breastfeeding at four weeks postpartum and 67 percent at 16 weeks, compared with 71 percent at four weeks postpartum and 47 percent at 16 weeks among women who had delivered at the hospital prior to the interventions (Saunders and Carroll, 1988).

The studies in Mexico, the U.K. and U.S.A. found that their interventions were at least partly beneficial, while studies in Guatemala, Honduras and Kenya have methodological limitations that make it difficult to attribute outcomes to study interventions. More research is needed to determine the most effective interventions to promote continued breastfeeding.

Table 4. Continued Breastfeeding: Summary of Interventions and Benefits

		INTERVENTIONS										
Reference	**Country**	**Study Design**	**Pre-natal Educ.**	**Hospital Policies/ Actions**	**Health Worker Training**	**Peer Counseling**	**Mass Media**	**Women's Groups**	**Home Visits**	**Community Educ.**	**Post-partum Clinics**	**Beneficial?**
Salariya et al., 1978	U.K.	A		✓								Yes
Vandale-Toney et al., 1992	Mexico	B		✓	✓							Partly
Stone-Jimenez & de Maza, 1993	Guatemala	C				✓		✓				Probably
Popkin et al., 1991	Honduras	C		✓	✓				✓			Probably
Bradley & Meme, 1992	Kenya	C		✓	✓							Probably
Saunders & Carroll, 1988	U.S.A.	C		✓				✓				Yes

VI. Cross-Cutting Issues

Favorable Policy Environment

Many studies examined the impact of major changes in hospital policies and practices. These changes were usually adopted by the administrators of individual hospitals, delivery rooms, or maternity wards rather than as a national system-wide change affecting all public and private hospitals and clinics. Clearly a system-wide change would have more widespread and lasting effects.

Little research has been done on the key policy interventions that affect the structural elements that impede women's ability to breastfeed: restrictions on the marketing and distribution of breastmilk substitutes, changes in the workplace, maternity protection laws, and child care facilities. Attributing changes in breastfeeding behaviors to such interventions may be difficult, but their potential impact is enormous.

Once policies are adopted, researchers can help to monitor their implementation and help to determine the best strategies for countering barriers to implementation. A study conducted in four cities in Bangladesh, Poland, South Africa, and Thailand revealed widespread violations of the International Code of Marketing of Breast Milk Substitutes. Between eight and 50 percent of the health facilities surveyed had received free samples of breastmilk substitutes, and between two and 18 percent of health workers had received gifts from companies that manufacture or distribute breastmilk substitutes (Taylor, 1998). This information can be used to advocate better enforcement of existing policies.

Timing of Interventions

In promoting improved breastfeeding, the timing of interventions is critical because it affects the mother's decision-making processes, trial behaviors, motivation to overcome problems, and persistence in maintaining recommended feeding practices. In general, interventions need to be delivered close to the time of the desired behavior. For example, prenatal education influences the initial decision to breastfeed, while guidance soon after delivery and in the first week postpartum can help mothers to establish breastfeeding. Furthermore, each stage of breastfeeding builds on the previous one.

Mothers also need specific information that corresponds to their child's age. Initially mothers need information and guidance related to breastfeeding initiation and feeding of colostrum. Then the emphasis shifts to the importance of exclusive breastfeeding for the infant's first six months. Mothers of infants six months of age need to know how to introduce appropriate complementary foods and should be encouraged to continue breastfeeding. Additional messages may be needed for infants aged seven to 24 months to counter poor nutrition or micronutrient deficiencies.

Reinforcement is important. Mothers who receive continual reinforcement and follow-up are more likely to persist in the recommended feeding behaviors than those who have little or no exposure to information and assistance. Feeding practices are often dictated by cultural and social norms. Changing them takes time and persistence.

The following sections discuss how the timing of specific interventions affects the four breastfeeding behaviors.

Prenatal period. Studies have found that women who received information about breastfeeding during the prenatal period were more likely to decide to breastfeed, to initiate breastfeeding, to feed their infants colostrum, and to breastfeed exclusively longer than women who did not receive such information (Morrow et al., 1996; Pugin et al., 1996; Tamagond and Saroja, 1992; Wiles, 1984). One study in Chile found that women who attended extra prenatal breastfeeding sessions were more likely to be fully breastfeeding at six months postpartum than women who had less extensive prenatal education (Pugin et al., 1996). Clearly, interventions during the prenatal period have short- and long-term benefits for breastfeeding.

The available research does not provide any guidance on whether prenatal education merits greater emphasis or whether intensive education and counseling at the time of delivery can compensate for limited prenatal education. In countries where breastfeeding is the norm, prenatal education may not be needed to influence the decision to breastfeed. Nevertheless, it can be useful in teaching breastfeeding techniques and conveying the importance of exclusive breastfeeding for the infant's first six months.

Delivery and First Few Postpartum Days. Since delivery is the first contact between mother and child, the time of delivery and the first few postpartum days are important to the initiation of correct breastfeeding techniques. Even when interventions provided at the time of delivery have no discernible effect on breastfeeding initiation, they may contribute to longer periods of exclusive breastfeeding. The key interventions at delivery are rooming-in, avoidance of prelacteal feeds and formula, in-hospital breastfeeding education and individual counseling, immediate mother-infant contact after birth, including suckling, and hospital discharge packs that reinforce breastfeeding messages.

These practices are associated with changes in breastfeeding initiation, feeding colostrum, and exclusive breastfeeding. The relative impact of hospital practices (rooming-in, avoidance of prelacteal feeds etc.) on exclusive breastfeeding varies according to the setting, but generally lasts from one to three months postpartum (Gerung, 1989; Lutter et al., 1997; Valdés, 1993).

Optimizing conditions for breastfeeding at the time of delivery should be a high priority for all programs. However, many women who have been separated from their infants for up to 24 hours following delivery in hospital still manage to establish breastfeeding, so it should be emphasized that the first few days at home are also important to breastfeeding initiation and subsequent success.

The first month postpartum. The mother and newborn's first month together is a critical period for establishing breastfeeding routines and resolving problems. Inputs at this time have a major effect on the duration of exclusive breastfeeding. The available research suggests that the more inputs (e.g. home visits, advice on resolving specific breastfeeding problems, mothers' support groups, information in the mass media) women receive, the better the outcome.

Two to six months postpartum. Mothers need encouragement and support to continue exclusive breastfeeding until their infant is around six months old. In many cultures, it is traditional to introduce liquids and solid foods to infants before six months of age. Many health professionals continue to recommend early introduction of liquids and solid foods, contrary to the consensus of nutrition and health experts.

Seven to 24 months postpartum. Providing mothers with information about the benefits of appropriate complementary foods, counseling them on food requirements of children at different ages and ways of meeting these requirements, and encouraging them to continue breastfeeding are important to ensure that children aged seven to 24 months receive adequate diets and avoid infectious diseases related to unhygienic conditions.

Audience Analysis

This review found that most programs differentiate their target audiences according to the age of the child, family income or place of residence. Many programs consider mothers to be a single entity, with little attention given to differences in age, parity, education or previous breastfeeding experiences.

Baseline data could be used to identify mothers most in need of breastfeeding education. First-time mothers and those under age 21 may need special attention. For example a study in Istanbul, Turkey found that 79 percent of mothers aged 16 to 20 planned to breastfeed, compared with 84 percent of those aged 21 to 25 and 86 percent of those 26 and older (Neyzi et al., 1988). This difference indicates the

need to reach young mothers before delivery to educate them on the benefits of breastfeeding, to give them special attention after delivery to ensure that they learn correct breastfeeding techniques, and to arrange for postpartum follow-up to assist them in establishing and maintaining breastfeeding. Studies are needed to determine whether intensive interventions to assist young, first-time mothers reduce the effort needed for their successive births.

Another possible target audience is women without a personal support system such as friends and older female relatives. Some studies suggest that providing psychological support to mothers during labor and delivery can affect their success in breastfeeding. A study in South Africa found that mothers who were supported by a peer volunteer during delivery breastfed longer, even though the volunteer never mentioned breastfeeding or even visited the mother in the maternity ward (Hofmeyr et al., 1991).

VII. Key Findings

The articles reviewed for this study describe a range of interventions for promoting the early initiation of breastfeeding, the feeding of colostrum and exclusive and continued breastfeeding. Because most studies suffer from major methodological limitations (flawed designs that make it impossible to sort out what works and what does not; inadequate controls; failure to account for confounding variables; participant self-selection; and small sample sizes), results need to be interpreted cautiously. Even so, in some instances, there is sufficient evidence from a few rigorous studies to draw conclusions about best practices with some degree of confidence. Additionally, there may be a number of methodologically weaker studies that when taken as a whole, suggest that the weight of evidence favors certain approaches to promoting and sustaining the four key behavioral changes reviewed in this study. The key findings presented below are those directly gleaned from the studies reviewed for this paper.

National Policy Changes

Only one of the 51 studies reviewed here examined the impact of national policy changes. This study reviewed practices before and after the Kenya Ministry of Health implemented a breastfeeding promotion program. In particular, the Ministry of Health adopted a Code of Marketing of Breastmilk Substitutes and issued directives to all hospitals to stop distributing infant formula and giving routine prelacteal feedings and to begin promoting early breastfeeding. The Ministry also trained more than 800 health workers in breastfeeding promotion and lactation management. Given the design of the study, it is not possible to conclude definitively that the program resulted in change. However, after the program, hospital policymakers and maternity ward staff were more knowledgeable about breastfeeding and their practices improved dramatically. Clearly, more policy research is needed to determine if and how changes at the policy level affect breastfeeding behaviors.

Prenatal Education

Few studies focused on the impact of prenatal education in isolation. However, some results suggest that prenatal education, when combined with other interventions, such as training of health providers, changes in hospital policies to allow early breastfeeding and contact with the newborn, and access to an outpatient breastfeeding support clinic are associated with improved breastfeeding practices. One study found that mothers in their last three months of pregnancy who had access to health promoters had higher rates of exclusive breastfeeding at one, four, and six months postpartum. Other studies suggest that the same results can be obtained through the distribution of educational pamphlets. Yet other studies pointed to no impact.

Changes in Hospital Practices including Health Worker Training

There are numerous well-executed studies relating to the impact of changing

hospital practices. On the whole, these suggest that:

- counseling (especially individual counseling) and discharge packs that are supportive of breastfeeding can have a dramatic and positive effect on exclusive breastfeeding rates;
- training of hospital staff in lactation management can likewise have a dramatic, positive effect on exclusive breastfeeding;
- once women are discharged from the hospital, home visits are influential in extending the period of exclusive breastfeeding; and
- changes in hospital practices influence early breastfeeding behavior but are less likely to have a long-term impact

A number of other studies,—less rigorous in their design—suggest that:

- in-service training of hospital staff in lactation management (in combination with other interventions) is at least modestly associated with early initiation of breastfeeding and the giving of colostrum;
- initial contact with the mother is associated with better suckling;
- early initiation and frequent feeding lead to longer breastfeeding duration; and
- early education of mothers can increase the early initiation of breastfeeding.

Mass Media and Print Materials

There are few definitive studies on the impact of mass media on breastfeeding behaviors. Of the studies that were sufficiently rigorous to draw conclusions about impact, none singled out mass media (relative to other interventions). Given the methodological limitations associated with these studies, it is not yet possible to draw conclusions about the impact of mass media on breastfeeding practices.

Peer Counseling and Education

A majority of studies lend credence to the notion that peer counseling and social support in general have a positive effect on the initiation of breastfeeding, giving colostrum, and exclusive breastfeeding. In particular, home visits appear to play a critical role in supporting women's breastfeeding behaviors and have been associated with longer durations of exclusive breastfeeding. In general, mothers visited more frequently are more likely to adopt recommended behaviors than those visited less often or not at all. For example, a study in Mexico found that women visited six times by a peer counselor had higher rates of exclusive breastfeeding at three months postpartum than those who were visited three times or were not visited (Morrow et al., 1996). The relative cost to attain improved outcomes has not been assessed.

In one setting, trained peer counselors did as well as health workers in educating mothers on improved breastfeeding practices. Factors leading to peer counselors' success appear to be their similarity to mothers which helps to establish good rapport and trust, their proximity and availability to advise on problems and answer questions, and frequent contact. In cases where peer counselors have not performed well, the problems are attributed to low motivation, infrequent contact with mothers due to travel conditions, difficulty in sustaining groups of volunteers, volunteers' inadequate knowledge of breastfeeding techniques, and volunteers' lack of skills in conducting group meetings and counseling. Volunteers need supervision and monitoring to ensure that they are completing their assigned tasks and are providing appropriate information and guidance.

Women's Groups

Surprisingly little research has been conducted on the impact of support groups—whether groups are established expressly to encourage mothers to breastfeed, as in La Leche League groups, or whether groups have a different goal, for example, receiving credit or sharing information. One study, carried out by Freedom from Hunger in Ghana, strongly suggests that women who participate in

"Credit with Education" groups are more likely to give colostrum than women from the same communities who do not participate in the groups and women from comparison communities. Mean age at introduction of water and watery foods is also significantly greater among participating mothers.

Postpartum Counseling and Guidance by Health Workers

Evidence regarding the impact of postpartum counseling and guidance by health workers is mixed. For instance, in one study, counseling and referrals by community volunteer breastfeeding advocates did not increase the prevalence or duration of exclusive breastfeeding. In another study, individual counseling and monthly clinical support collectively contributed to higher rates of exclusive breastfeeding at six months postpartum. Clearly, more research on counseling is needed to identify what works in different settings. These studies should document the impact of various counseling approaches, provided by a variety of individuals, including breastfeeding advocates, community health workers and clinic-based staff.

VIII. Areas for Future Research

This study points unequivocally to the need to strengthen research on early initiation of breastfeeding, the giving of colostrum, and exclusive and continued breastfeeding. Future research will need to carefully consider at least three factors: geography, methodology and content.

Geography

To date, most research on breastfeeding has occurred in Latin America. In this review, more studies took place in Latin America than in Africa, Asia, and the Middle East combined. Clearly, more research is needed in sub-Saharan Africa and the Middle East and, to a lesser extent, Asia. There is a general need to distinguish strategies that appear to be successful in particular situations from those that may be more widely applicable.

Methodology

A majority of studies were so flawed methodologically that conclusions about impact could not be drawn with any degree of certainty. In order to more fully assess the impact of program interventions, future research will need to include baseline and follow-up data collection and information from program participants and controls. Just as importantly, well-designed operations research is needed to help identify which interventions and combinations of interventions change breastfeeding behaviors. Only a handful of studies reviewed here were designed such that the relative impact of specific interventions could be assessed. Research that compares and contrasts mass media and support groups, for example, would help clarify how these strategies influence behavior change for individuals, communities and regions. Research that adequately controls for confounding variables and self-selection is likewise clearly mandated.

Content

Given the lack of information about the following content areas, additional research is needed.

- **Audience analysis.** This review found that most programs differentiate their target audiences according to the age of the child, family income, or place of residence. Many programs consider mothers to be a single entity, with little attention given to differences in age, parity, education, or previous breastfeeding experiences. Baseline data could be used to identify mothers most in need of breastfeeding education. First-time mothers, those under age 21, and those in the workforce may need special attention. Another possible target audience is women without a personal support system such as friends and older female relatives.
- **Mothers' support groups.** Mothers' support groups represent a major strategy in the promotion of exclusive and continued breastfeeding. How-

ever, only a few studies rigorously assessed their effectiveness. Future research needs to focus on the behavioral impact of mothers' support groups in isolation and in combination with other strategies. In addition to examining the impact of support groups organized around breastfeeding (for example, groups following the La Leche League model), research should also assess the effect of introducing breastfeeding topics into other women's groups, including those offering microcredit.

- **The influence of peer counselors**. Peer counselors offer a promising approach to positively influence breastfeeding behaviors. Key issues that need to be addressed in future research and programs include the identification of cost-effective ways of motivating volunteers, improved understanding of the level of contact needed between mothers and counselors, and clarification about what systems of training and supervision are most cost-effective.
- **The role of mass media**. Surprisingly little research is available regarding the impact of mass media efforts. What are the most effective uses of mass media? What behavior changes can one expect from a well-executed mass media campaign? How long after a media campaign has ended do the effects last?
- **Interpersonal networks**. While there is a growing body of research on the impact of "trend-setters," "positive deviants," and "early adopters" in the field of child nutrition in general, little is known about the feasibility of using these approaches to diffuse optimal breastfeeding behaviors to other mothers in the community.
- **The cost-effectiveness of programs**. Few studies examined program costs relative to impact. Future research could answer such questions as: Which interventions are most cost-effective in promoting exclusive breastfeeding? Which channels most cost-effectively reach mothers in the early postpartum months or when children are six months old? Does the introduction of mothers' support groups add value to mass media campaigns? Can radio spots convey some of the messages normally provided in face-to-face counseling? Studies focusing on cost-effectiveness need to clearly document program inputs, including the economic value of non-financial inputs such as volunteer labor and mothers' time.
- **Policy impact**. Only one study assessed the impact of changing national policies. Additional studies are needed to identify how policies and legislation influence maternity leave, child care, the quality of services offered by universities, hospitals and clinics, and other relevant topics. Future research should also assess the extent to which new policies and training of health care providers affect women's breastfeeding behaviors and providers' knowledge, attitudes, and practices.

IX. Conclusions

This review has shown that various program interventions can change key breastfeeding behaviors. Some interventions are more effective in reaching specific audiences or bringing about specific behavior changes. Combinations of interventions are often needed to have the desired effect on knowledge and behavior.

The major challenge ahead is to ensure that the interventions selected to influence specific breastfeeding behaviors are the most cost-effective means to reach priority audiences, convey well-designed messages effectively, and measure impacts on behavior. More research is needed to learn more about the interventions and/or combination of interventions that work best in specific settings.

Beyond improving breastfeeding practices among a larger proportion of the target population, programs need to put more effort and resources into sustaining the new practices at higher levels by maintaining program continuity. Many countries have seen breastfeeding prevalence

rise during intensive promotional activities and then fall once the campaign is over.

The main task in promoting optimal breastfeeding practices is to provide women with the right information at the right time, matched to their own perspectives and situation. Infant feeding advice changes as the infant ages. Therefore programs need to establish a system for making contact with pregnant women, helping them to establish breastfeeding, and then providing them with periodic updates as their child's nutritional needs change. These periodic updates can come from a variety of sources: clinic workers during well-baby check-ups, health workers or community volunteers making home visits, leaders of support groups, mass media, and print materials. Mothers need clear messages that they can act on and have access to respected sources of advice and information.

Breastfeeding requires continual practice: women must begin nursing soon after birth and continue nursing regularly if they are to achieve exclusive breastfeeding for the infant's first six months of life. Thus interventions are needed to help women make the decision to breastfeed prior to delivery and to ensure that their experiences following delivery are supportive of breastfeeding. On the other hand, a poor start does not necessarily doom women to resort to artificial feeding. In cultures where breastfeeding is the norm as well as those in which it is not, many women breastfeed successfully after being separated from their infant in the hospital. Therefore ensuring that mothers have appropriate support systems in their community and through the health care system is as important as reforming hospital practices.

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Appendix B
Detailed Tables on Interventions to Improve Breastfeeding Behaviors

The following tables report on the studies discussed in the paper, providing information on study design, population characteristics, sample size, methodological limitations, results, and conclusions. Table 5 reports on Early Initiation, Table 6 on Feeding of Colostrum, Table 7 on Exclusive Breastfeeding, and Table 8 on Continued Breastfeeding. The coding used in the table is as follows:

Study Design

A Studies comparing intervention and control or comparison groups before and after the intervention (most rigorous studies)

B Studies comparing intervention and control or comparison groups (no baseline)

C Studies comparing the same group(s) before and after the intervention (no control group)

Methodological Limitations (based on WHO's *Evidence for the Ten Steps to Successful Breastfeeding*)

1. Inadequate control: (a) pre-post comparison without control group; (b) inadequate documentation of between-group differences and similarities; and (c) baseline behavioral measurements inadequate or lacking
2. Confounding variables not controlled
3. Self-selection of participants
4. High attrition (more than 10% attrition rate unevenly distributed)
5. Undetermined internal validity: unreported attrition, poorly documented methodology or unpublished brief communication
6. One-to-one comparison
7. Long recall period
8. Unclear definition of breastfeeding indicators
9. Based on planned or reported breastfeeding
10. Small sample size (< 100)

Table 5. Early Initiation

Part A. Studies Comparing Intervention and Control or Comparison Groups before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Langer et al., 1996 Mexico 1c,2	Women delivering at an urban social security hospital	Control: no family members or friends allowed in delivery room Int: first-time mothers assigned a woman to provide social support during delivery and to discuss breastfeeding post-delivery.	Contr: 363; Int: 361	8% of infants were breastfed in the 1st 8 hours after birth.	11% of infants were breastfed in the 1st 8 hours after birth.	Providing social support at the time of delivery had little effect because it did not change hospital norms.

Part B. Studies Comparing Intervention and Control or Comparison Groups (no baseline)

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Sanghvi, 1995 Brazil 1a,1b,1c,2,5	Mothers delivering at 2 hospitals	Int: hospital actively promoted breastfeeding by avoiding mother-infant separation, allowing mothers to hold infant in delivery room, assisting with breastfeeding the 1st time, giving talks in-hospital, and counseling in the 1st month postpartum. Such policies were less actively promoted in the control hospital.	Preint: 152; Int: 168	3% of mothers breastfed their infant within ½ hour of birth.	46% of mothers breastfed their infant within ½ hour of birth.	Rigorous implementation of baby-friendly hospital policies was beneficial.
Valdés et al., 1993; Peréz & Valdés, 1991; Pugin, 1996 Chile 1b,1c,2,5	Middle-class, urban women delivering at a private hospital	Control: routine postnatal care Int: Intervention group benefitted from 5 activities: training of health providers, activities at prenatal clinic, hospital activities, changes in hospital policies to permit early contact, & lactation clinic.	Contr: 313; Int: 422	Average time from birth to breastfeeding initiation was 6.7 hours.	Average time from birth to breastfeeding initiation was 2.8 hours ($p<0.0001$).	The combination of training of health workers, prenatal education, hospital education, early contact, & lactation clinic was beneficial.

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Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Prasad & Costello, 1995 India 1c,2	Rural mothers delivering at a government district hospital, mostly illiterate and primiparous	Preint: routine nursery care Int 1: maternity care workers trained to assist mothers to nurse in hospital, subjects delivering within 20 days of workers' training Int 2: maternity care workers trained to assist mothers to nurse, subjects delivering 6 months after workers' training	Preint: 172; Int 1: 195; Int 2: 101	3% of mothers initiated breastfeeding within 1 hour after delivery.	Int 1: 60% of mothers initiated breastfeeding within 1 hour of delivery. Int 2: 14% of mothers initiated breastfeeding within 1 hour of delivery.	Training maternity care staff was beneficial, but the effects eroded 6 months after training.
Gerung, 1989 Indonesia 1a, 1c,2,5	Rural women delivering at a private hospital	Preint: newborns separated from mothers for 3-5 hours after birth, given fluids, followed by rooming-in Int: newborns put to breast immediately after birth, no prelacteal feeds, breastfeeding on demand, health workers trained, rooming-in	Preint: 376; Postint: 245	In 1985, 33% of mothers breastfed their newborn exclusively during their hospital stay.	In the 9 months following the intervention (Apr.-Dec. 1986), 94% of mothers breastfed their newborn exclusively during their hospital stay.	Changing hospital policies and training health workers appear to be beneficial, although a community-wide campaign promoting breastfeeding may have confounded results.
Vandale-Toney et al., 1992 Mexico 1a,1c,4	First-time mothers delivering at a large urban hospital	Control: women who delivered prior to hospital's new program Int: hospital adopted new program, including staff training in lactation management, promotion of early initiation, classes for 1st-time mothers, individual guidance in lactation management, and limitations on bottle feeding.	Contr: 175; Postint: 176	The average time between delivery and first nursing was 1.6 hours.	The average time between delivery and first nursing was 1.3 hours (n.s.).	Intervention had no significant impact on breastfeeding initiation.
Righard & Alade, 1990 Sweden 1a, 1c, 2,3,5,10	Women delivering in 2 urban university hospitals	Control: newborns rested on mother's abdomen for 15-20 minutes, were removed for 20 minutes and then were returned. Int: newborns stayed with their mother for at least 1 hour or until the 1st breastfeed had been accomplished.	Contr: 34; Int: 38	At 2 hours after birth, 21% of newborns had the correct sucking technique.	At 2 hours after birth, 63% of newborns had the correct sucking technique ($p<0.01$).	Keeping newborns with their mother for at least 1 hour or until the 1st breastfeed was beneficial.

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Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Kistin, Abramson & Dublin, 1994 U.S.A. 1b,1c,2,10	Low-income minority women who intended to breastfeed and had requested a counselor, delivering at an urban public hospital	Control: women who requested a counselor but did not receive one due to inadequate numbers of trained counselors Int: women who talked with a trained volunteer peer counselor before delivery, at least twice weekly until breastfeeding was established, every 1-2 weeks for the next 2 months, and then as needed.	Contr: 43; Int: 59	At hospital discharge, 70% had initiated breastfeeding.	At hospital discharge, 93% had initiated breastfeeding ($p<0.05$).	Individual counseling by volunteer peers was beneficial.

Part C. Studies Comparing the Same Group(s) before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Holley-Newsome, 1995, Armenia 1a,1b,1c,2,3,10	Mothers (average age 23) of newborns, attending urban clinics	One-month national media campaign with TV & radio spots, newspaper ads & brochures.	Preint: 479; Postint: 37	12% initiated breastfeeding within 0-6 hours after delivery.	73% initiated breastfeeding within 0-6 hours after delivery.	Improvements were observed but are not clearly attributable to the intervention.
Popkin et al., 1991; Huffman et al., 1991 Honduras 1a,2,5,9	Health professionals and post-partum women living in 19 low-income communities of Tegucigalpa	Counseling in hospital maternity wards & home visits by breastfeeding specialists, training of health workers, changes in hospital practices to promote early initiation and rooming-in and eliminate routine formula feeding.	Preint: 334 health prof. & 449 new mothers; Postint: 166 health prof. & 166 new mothers	In 1982 27% of urban health professionals recommended that women initiate breastfeeding at birth. In 1982 none of the mothers initiated breastfeeding during the 1st hour after birth.	In 1985 87% of urban health professionals recommended that women initiate breastfeeding at birth ($p<0.01$). In 1985 more than 50% of the mothers in 2 of the 3 hospitals initiated breastfeeding during the 1st hour after birth.	The combination of hospital counseling, training of health workers & changes in hospital practices was beneficial.

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Lal et al., 1992 India 1a,1b,2,9	Mothers living in 10 villages in Haryana state	12 existing women's groups received 1-week training in maternal and child health. Members attended weekly educational meetings, and each one volunteered to contact 10-20 households to promote improved health practices.	Preint: 300; Postint: 300	In 1988 23% of mothers began breastfeeding immediately after birth or on the same day.	In 1990 60% of mothers began breastfeeding immediately after birth or on the same day ($p<0.05$).	Community education by members of women's groups appears to have been beneficial.
McDivitt et al., 1993 Jordan 1a	Mothers of children aged 2 & younger nationwide	Int: seminar for health professionals and two mass media campaigns lasting 2 months each, with daily radio & TV spots.	Preint: 930; Postint: 966	In 1988 40% of mothers initiated breastfeeding within 6 hours after birth.	In 1990 54% of mothers initiated breastfeeding within 6 hours after birth ($p<0.05$).	The mass media campaign and seminar for health professionals were beneficial. Private hospitals did not change policies preventing early initiation.
Bradley & Meme, 1992 Kenya 1a,1b,2,9	Hospital policy-makers and senior staff and maternity ward staff in 58 hospitals nationwide	Int: national breastfeeding program: adoption of Code of Marketing of Breastmilk Substitutes, directives to hospitals to promote early breastfeeding & rooming-in, & training of health workers.	Preint: 195 health workers; Postint: 109 hospital policy-makers & senior staff; 175 maternity ward staff	14% of health workers reported that babies were put to breast within 1 hour of birth.	61% of health workers reported that babies were put to breast within 1 hour of birth.	The national program appears to have been beneficial in changing health workers' practices. Eliminating infant formula was effective in changing hospital practices.
Huffman, 1991 Panama 1a,1c,5	Women delivering in Penonome Hospital, which serves a 75% rural area	Preint: newborn infants were fed breastmilk substitutes and kept in a separate nursery until hospital discharge 24 hours after delivery Int: hospital policies were changed to eliminate formula feeding and reduce mother-child separation to ½ -3 hours.	Sample size was not reported.	In 1984 Penonome Hospital provided 5,855 bottles to newborns.	In 1986 Penonome Hospital provided 1,750 bottles to newborns – less than 1/3 of previous levels.	Changes in hospital practices appear to have been beneficial.

n.s. = not significant

Methodological Limitations (based on WHO's ***Evidence for the Ten Steps to Successful Breastfeeding***)

1. Inadequate control: (a) pre-post comparison without control group; (b) inadequate documentation of between-group differences and similarities; and (c) baseline behavioral measurements inadequate or lacking
2. Confounding variables not controlled
3. Self-selection of participants
4. High attrition (more than 10% attrition rate unevenly distributed)
5. Undetermined internal validity: unreported attrition, poorly documented methodology or unpublished brief communication
6. One-to-one comparison
7. Long recall period
8. Unclear definition of breastfeeding indicators
9. Based on planned or reported breastfeeding
10. Small sample size (<100)

Table 6. Feeding Colostrum

Part A. Studies Comparing Intervention and Control or Comparison Groups before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
MkNelly, 1997 Ghana 1b,3,9,10	Rural mothers of one-year-old children	Control 1: women in communities without Credit with Education programs Control 2: nonparticipants in program communities Int 1: women who had participated in program (small group education and discussions) for >1 yr.	Contr 1: 102; Contr 2: 112; Int 1: 55	Contr 1: 71% fed colostrum. Contr 2: 76% fed colostrum.	Int. 1: 96% fed colostrum.	Group education and discussion were beneficial to participants but had no effect on non-participants living in the same community.
Griffiths, 1991; Zeitlin et al., 1989 Indonesia 1b,2	Rural and semi-urban mothers of children <2 yrs.	Control: no nutrition education Int: nutrition education by village volunteers at health posts plus radio and print materials	Contr: 387; Int: 390	38% fed colostrum.	50% fed colostrum (of those exposed to materials, 63% fed colostrum).	Education by village volunteers plus radio and print materials were beneficial.
Gottert, 1995; Ross, 1997 Mali 1b,2,10	Mothers of children <3 yrs. old	Control: no nutrition education Int: individual counseling and group education by field workers, village meetings, radio and print materials	Contr: 97; Int: 196	42% fed colostrum.	58% fed colostrum.	Combination of interpersonal and mass media interventions was beneficial.

Part B. Studies Comparing Intervention and Control or Comparison Groups (no baseline)

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Prasad & Costello, 1995 India 1c,2	Rural mothers delivering at a government district hospital, mostly illiterate and primiparous	Preint: routine nursery care Int 1: maternity care workers trained to assist mothers to nurse in hospital, subjects delivering within 20 days of workers' training Int 2: maternity care workers trained to assist mothers to nurse, subjects delivering 6 months after workers' training	Preint: 172; Int 1: 195; Int 2: 101	96% of mothers gave prelacteal feeds.	Int 1: 43% of mothers gave prelacteal feeds. Int 2: 77% of mothers gave prelacteal feeds.	Training maternity care staff was beneficial, but the effects eroded 6 months after training.
Tamagond & Saroja, 1992 India 1b,1c,10	Urban pregnant women with >5 years' education & previous child not fed colostrum	Control: routine prenatal care Int 1: 3 prenatal lectures & discussion Int 2: 3 pamphlets sent by mail before delivery	Contr: 40; Int 1: 40; Int 2: 40	0 fed colostrum post-intervention.	Int 1: 33% fed colostrum exclusively. Int 2: 43% fed colostrum exclusively.	Both prenatal lectures and pamphlets were beneficial. Pamphlets were more cost-effective.
Gerung, 1989 Indonesia 1a, 1c,2,5	Rural women delivering at a private hospital	Preint: newborns separated from mothers for 3-5 hours after birth, given fluids, followed by rooming-in. Int: hospital changed its procedures: newborns put to breast immediately after birth, no prelacteal feeds, breastfeeding on demand, health workers trained, rooming-in.	Preint: 376; Postint: 245	33% of mothers breastfed their newborn exclusively during 1985; 61% of mothers delivering in the first quarter of 1986 did so.	94% of mothers breastfed their newborn exclusively during the 9 months following the intervention (Apr.-Dec. 1986).	Changing hospital procedures and training health workers appear to have been beneficial, although a community-wide campaign promoting breastfeeding may have confounded the results.

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Part C. Studies with Non-experimental Designs (Comparing One or More Groups before and after the Intervention)

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Valdes et al., 1994 Chile 1a,1c,2,3,4,7,9	Health professionals (midwives, nurses, physicians and others)	Int: 3-day course for 360 health professionals. Two years later, participants were surveyed on practices before and after course.	Postint: 100	75% of health workers report that newborns are fed colostrum as 1st feeding.	91% of health workers report that newborns are fed colostrum as 1st feeding.	Study provides weak support for use of training to change behaviors of health professionals.
Bradley & Meme, 1992 Kenya 1a,1b,2,9	Maternity ward staff in 58 hospitals throughout the country	Preint: routine prelacteal feedings Int: MOH directive to stop routine prelacteal feedings; adoption of Code of Marketing of Breastmilk Substitutes; training of health workers	Preint: 195; Postint: 175	93% of health workers reported prelacteal feeds as the norm.	48% of health workers reported prelacteal feeds as the norm.	The MOH program preceded reduction in reported prelacteal feeds.
Clavano, 1982 Philippines 1a,1b,2	Mothers delivering at an urban hospital	Preint: bottlefeeding in nurseries, 8-12-hour starvation period after birth Int: rooming-in, breastfeeding on demand, 2-hour starvation period	Preint: 4,720; Postint: 5,166	40% breastfed newborns.	87% breastfed newborns.	Changes in hospital procedures appear to have been beneficial.

n.s. = not significant

Methodological Limitations (based on WHO's *Evidence for the Ten Steps to Successful Breastfeeding*)

1. Inadequate control: (a) pre-post comparison without control group; (b) inadequate documentation of between-group differences and similarities; and (c) baseline behavioral measurements inadequate or lacking
2. Confounding variables not controlled
3. Self-selection of participants
4. High attrition (more than 10% attrition rate unevenly distributed)
5. Undetermined internal validity: unreported attrition, poorly documented methodology or unpublished brief communication
6. One-to-one comparison
7. Long recall period
8. Unclear definition of breastfeeding indicators
9. Based on planned or reported breastfeeding
10. Small sample size (<100)

Table 7. Exclusive Breastfeeding

Part A. Studies Comparing Intervention and Control or Comparison Groups before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Haider et al., 1996 Bangladesh 2	Mothers of partially breastfed infants under 12 weeks old admitted to hospital due to diarrhea	Control: routine group education Int: individual counseling and home visits 1 & 2 weeks after hospital discharge.	Contr: 125; Int: 125	6% of mothers were breastfeeding exclusively at discharge, and 8% at 2 weeks after discharge.	60% of mothers were breastfeeding exclusively at discharge ($p<0.001$), and 75% at 2 weeks after discharge ($p<0.001$).	Individual counseling in hospital and home visits was beneficial in restoring exclusive breastfeeding.
Alvarado et al., 1996 Chile 1b,1c,2,10	Low-income urban women delivering in hospital	Control: 4 clinic visits during the 1st 6 months postpartum for routine pediatric care. Int: 8 clinic visits during the 1st 6 months postpartum, visits by peer educators at home in the last 3 months of pregnancy and in the hospital post-delivery, 2-hour workshops led by peer educators attended twice during pregnancy and monthly during the 1st 6 months postpartum.	Contr: 62; Int: 66	At 1 month of age, 76% of the infants were being exclusively breastfed., compared with 8%at 4 months of age, and none at 6 months of age.	At 1 month of age, 100% of the infants were being exclusively breastfed ($p<0.01$). At 4 months of age, 90% were still being exclusively breastfed ($p<0.01$), and 42% at 6 months of age ($p<0.01$).	Frequent clinic visits and visits and educational workshops by peer educators were beneficial.
AHLACMA, 1993 Honduras 2	Pregnant women and women with children under age 1 living in 40 rural communities	Control: routine health education by community health educators, midwives & volunteers Int: monthly group meetings organized by trained volunteer peer counselors, home visits by peer counselors, and print materials.	Contr: Pre. 209 & Post. 226 ; Int: Pre. 207 & Post. 221	Mean duration of exclusive breastfeeding declined from 2.2 months to 1.3 months.	Mean duration of exclusive breastfeeding increased from 1.2 months to 3.0 months.	The various educational activities of the trained peer counselors were more effective than routine health education programs.

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Rivera et al., 1993 Honduras 1b,9	Low-income mothers of infants <1 years old living in an urban area	Control: health professionals in community were trained Int: same as control plus individual counseling by a trained peer and mothers' support group meetings led by peer counselor (Only 12% of mothers had any contact with the peer educators; 7% attended a support group meeting).	Baseline: 922; Contr: 435; Int: 487	At baseline and endline, infants were exclusively breastfed for about 4 weeks.	At baseline and endline, infants were exclusively breastfed for about 4 weeks (n.s.). Mothers who had contact with the peer counselors breastfed exclusively for 9.6 weeks.	Peer education and mothers' support groups had no impact on community-wide duration of exclusive breastfeeding, probably due to limited coverage.
Gottert, 1995; Ross, 1997 Mali 1b,2,10	Mothers of children <3 years old	Control: no nutrition education Int: individual counseling and group education by field workers, village meetings, radio and print materials	Contr: 97; Int: 196	10% of mothers did not give water to infants under 4 months old.	21% of mothers did not give water to infants under 4 months old.	The combination of interpersonal and mass media interventions was beneficial.
Langer et al., 1996 Mexico 1b,2	Women delivering at an urban social security hospital	Control: no family members or friends allowed in delivery room Int: first-time mothers assigned a woman to provide social support during delivery and to discuss breastfeeding post-delivery.	Contr: 363; Int: 361	7% of infants were exclusively breastfed at 1 month postpartum	12% of infants were exclusively breastfed at 1 month postpartum	Providing social support at the time of delivery was modestly beneficial.

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Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Nutrition Communication Project, 1995b; Altobelli, 1993 Peru 1b,2,10	Low-income urban mothers delivering at 3 hospitals	Control: no materials; 40% of mothers received breastfeeding education Int 1: training course for health workers; print materials for health workers & mothers; 75% of mothers received breastfeeding education Int 2: most comprehensive hospital program; 90% of mothers received breastfeeding education	Contr: 107; Int 1: 99; Int 2: 115	20% of infants were exclusively breastfed at 2 weeks postpartum, and 8% at 12 weeks postpartum.	Int 1: 35% of infants were exclusively breastfed at 2 weeks postpartum, (signif.) and 17% at 12 weeks postpartum (n.s.). Int 2: 62% of infants were exclusively breastfed at 2 weeks postpartum (signif.), and 52% at 12 weeks postpartum (n.s.). Mothers in Int 2 had higher rates of exclusive breastfeeding at 4 weeks postpartum ($p<0.05$) than those in Int 1, but rates at 8 and 12 weeks postpartum were not significant.	Training health workers and providing print materials were beneficial. More exposure was associated with improved breastfeeding practices.
Neyzi et al., 1988; Neyzi et al., 1991a Turkey 4	Middle-income women delivering in an urban social security hospital	Control: 8-minute film on ORT and home visit 5-7 days postpartum on hygiene and baby care; Int: same as control group plus breastfeeding education via a 10-minute film, 40-minute group educational session, 20-30 minute home visit and brochure. Both: hospital did not have rooming-in or supportive routines.	Contr: 499; Int: 442	12% of the mothers were exclusively breastfeeding at 1 week postpartum, 4% at 1 month postpartum, 2% at 2 months postpartum, and 0.2% at 3 months postpartum.	47% of the mothers were exclusively breastfeeding at 1 week postpartum, 16% at 1 month postpartum, 4% at 2 months postpartum., and 1% at 3 months postpartum.	The in-hospital education and home visits were beneficial for the 1st 2 months postpartum.
Neyzi et al., 1991b Turkey 1b	Middle-income women delivering in an urban social security hospital	Control: routine follow-up Int: continuing support through visits at 2 weeks and 1, 2, 3, & 4 months at well-baby clinic at the hospital.	Contr: 442; Int: 146	Prevalence of exclusive breastfeeding fell from 47% at 1 week postpartum to 4% at 2 months postpartum and <1% at 4 months postpartum.	Prevalence of exclusive breastfeeding fell from 47% at 1 week postpartum to 17% at 2 months postpartum and 5% at 4 months postpartum	Regular medical visits were beneficial in maintaining breastfeeding up to 4 months.

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Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Waldenström & Nilsson, 1994 Sweden	Urban women	Control: delivery in hospital Int: delivery in birth center that provides psychologically supportive care with minimal medical technology Early breastfeeding initiation, feeding on demand, and correct positioning were similar for both groups.	Contr: 613; Int: 617	At 2 months postpartum, 93% were exclusively breastfeeding.	At 2 months postpartum, 93% were exclusively breastfeeding.	The place of delivery appears to be less important than breastfeeding initiation routines, rooming-in and feeding on demand.
Dungy et al., 1992 U.S.A. 1b,4,9,10	Middle-income, well-educated women delivering at an urban hospital, who had initiated breastfeeding	Control: commercially available infant formula package at hospital discharge Int: discharge pack containing a manual breast pump, breast pads & breast cream.	Contr:73; Int: 73	Mean duration of exclusive breastfeeding was 2.8 weeks.	Mean duration of exclusive breastfeeding was 4.2 weeks ($p<0.05$).	The discharge pack containing a manual breast pump was beneficial.
Frank et al., 1987 U.S.A. 10	Women delivering at an urban hospital serving mainly low-income women	Control: routine breastfeeding counseling (nursing counseling, breastfeeding classes & handouts) and commercial discharge pack (pamphlets, nipples & water) Int 1: routine breastfeeding counseling and research discharge pack (pamphlets & breast pads) Int 2: research breastfeeding counseling (individual counseling in hospital & 8 telephone calls up to 12 weeks postpartum) and commercial discharge pack Int 3: research breastfeeding counseling and research discharge pack	Contr: 83; Int 1: 78; Int 2: 84; Int 3: 79	Prevalence of exclusive breastfeeding was 53%, 20%, 6% & 5% at 1, 2, 3, & 4 months postpartum, respectively.	Prevalence of exclusive breastfeeding at 1, 2, 3, & 4 months postpartum was, respectively, Int 1: 53%, 28%, 15% & 6%; Int 2: 57%, 29%, 6% & 2%; Int 3: 62%, 43%, 20% & 9%. Women who received the research pack were more likely to be exclusively breastfeeding at 4 months postpartum than those who received the commercial pack ($p<0.01$). The group with the research pack and research counseling had higher rates of exclusive breastfeeding at 4 months postpartum than the other 3 groups ($p<0.05$).	The individual counseling in hospital & follow-up telephone calls were beneficial for 2 months postpartum. The discharge pack promoting breastfeeding was beneficial for 4 months postpartum.

Part B. Studies Comparing Intervention and Control or Comparison Groups (no baseline)

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Barros et al., 1995 Brazil 1c,2,3	Low- and middle-income urban mothers delivering in hospital	Control: mothers who did not attend a lactation center. Int: mothers who attended a lactation center during their infant's 1st 4 months. The centers offered individual counseling and group consultations (4 mother-infant pairs at a time).	Contr: 246; Int: 289	31% of infants were exclusively breastfed at 1 month postpartum, 18% at 4 months, and 6% at 6 months.	55% of infants were exclusively breastfed at 1 month postpartum ($p<0.001$), 43% at 4 months ($p<0.001$), and 15% at 6 months ($p<0.001$). 23% of those attending 5 or more times were exclusively breastfed at 6 months of age.	Lactation centers were beneficial.
Lutter et al., 1997 Brazil 1c,2	Low-income urban women delivering in hospital	Control: no breastfeeding promotion in hospital. Most mothers had no separations >15 minutes and received no breastmilk substitutes, but only one-third received help with breastfeeding the 1st time. Int: active breastfeeding promotion. Most mothers breastfed their infant in the delivery room, had no separations >15 minutes, received no breastmilk substitutes, and received a talk, brochure and help with breastfeeding the 1st time.	Contr: 206; Int: 236	Mothers breastfed exclusively for an average of 22 days.	Mothers breastfed exclusively for an average of 75 days ($p<0.01$).	The hospital program was beneficial. The relative importance of specific components could not be ascertained.
Valdés et al., 1993; Peréz & Valdés, 1991; Pugin et al., 1996 Chile 1b,1c,2,5,10	Middle-class, urban women delivering at a private hospital	Control: routine postnatal care Int 1: Intervention group benefitted from 5 activities: training of health providers, activities at prenatal clinic, hospital activities, changes in hospital policies to permit early contact, & lactation clinic Int 2: Same as Int 1 plus group education at prenatal clinics	Contr: 313; Int 1: 363; Int 2: 59	32% of infants were fully breastfed at 6 months postpartum.	Int 1: 65% of infants were fully breastfed at 6 months ($p<0.0001$). Int 2: 80% of infants were fully breastfed at 6 months ($p<0.01$).	The combination of training of health workers, prenatal education, hospital education, early contact, & lactation clinic was beneficial. Prenatal group education provided further benefits.

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Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Valdés, 1996 Chile 1b,1c,2,3,	Low- and middle-class urban women who were exclusively breastfeeding at 30 days postpartum and planned to return to work before 120 days postpartum	Control: routine pediatric care with follow-up calls to collect information on infant feeding and health monthly for 6 months and at 12 months Int: women received individual counseling on breastfeeding and were taught hand expression plus monthly clinic visits for the 1st 6 months postpartum and at 12 months.	Contr: 116; Int: 146	At 6 months postpartum 6% were exclusively breastfeeding.	At 6 months postpartum 54% were exclusively breastfeeding.	Individual counseling and monthly clinical support were beneficial.
Manoff International, 1984 Indonesia 1b,1c,2,9	Rural mothers of children <2 years old in 3 regions	Control: routine health education by village volunteers Int: child weighing, home visits and community meetings by village volunteers; posters; and radio minidramas	Contr: 318; Int: 464	41% of mothers waited until the child's 5th month to introduce foods.	57% of mothers waited until the child's 5th month to introduce foods ($p<0.001$).	Education by village volunteers, posters and radio was beneficial.
Morrow et al., 1996 Mexico 1b,1c,2,10	Low-income peri-urban women	Control: no home visits Int 1: 3 home visits by trained promoters, in late pregnancy, immediately after delivery and at 2 weeks postpartum Int 2: 6 home visits, 2 visits during pregnancy, immediately after delivery, and postpartum at 2, 4, & 8 weeks.	Contr: 53; Int 1: 53; Int 2: 53	7% of infants were exclusively breastfed from 2 weeks to 3 months of age.	Int 1: 33% of infants were exclusively breastfed from 2 weeks to 3 months of age ($p<0.05$); Int 2: 48% of infants were exclusively breastfed from 2 weeks to 3 months of age ($p<0.05$). Exclusive breastfeeding was significantly higher ($p<0.001$) in the 6-visit group than in the 3-visit group.	Home visits were beneficial, and 6 visits had more impact than 3 visits.
Rodriguez-Garcia et al., 1990 Mexico 1a,1b,2,5	Mothers living in 3 low-income communities who had at least 1 previous birth	Int: Prenatal education, 12 postpartum home visits (twice monthly), and print materials provided by volunteer peer counselors.	Contr: 155; Int: 430	63% of infants were exclusively breastfed in the 1st month postpartum, 15% in the 5th month, and 3% in the 6th month.	71% of infants were exclusively breastfed in the 1st month postpartum, 14% in the 5th month, and 9% in the 6th month.	Peer educators were beneficial in the early months of breastfeeding.

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Vandale-Toney et al., 1992 Mexico 1a,1c,4	First-time mothers delivering at a large urban hospital	Contr: women who delivered prior to hospital's new program Int: hospital adopted new program, including staff training in lactation management, promotion of early initiation, classes for 1st-time mothers, individual guidance in lactation management, and limitations on bottle feeding.	Contr: 175; Postint: 176	34% of infants 1 month old were exclusively breastfed. By 4 months postpartum, 2% of the infants were exclusively breastfed.	38% of infants 1 month old were exclusively breastfed (n.s.). By 4 months postpartum, none of the infants were exclusively breastfed (n.s.).	Intervention had no significant impact on exclusive breastfeeding.
Strachan-Lindenberg et al., 1990 Nicaragua 1b,1c	Low-income urban, first-time mothers delivering in hospital	Control: total separation of mother & infant during 12-24 hour hospital stay; routine infant feeding information Int 1: 45-minute mother-infant contact after birth, then separation until discharge; some breastfeeding information Int 2: early contact plus rooming-in; some breastfeeding information.	Contr: 123; Int 1: 136; Int 2: 116	At 1 week postpartum, 32% of mothers were exclusively breastfeeding. This proportion dropped to 10% at 4 months postpartum.	Int 1: 53% of mothers were exclusively breastfeeding at 1 week postpartum ($p<0.001$), and 12% at 4 months postpartum (n.s.). Int 2: 63% of mothers were exclusively breastfeeding at 1 week postpartum ($p<0.001$), and 7% at 4 months postpartum (n.s.).	Increased mother-infant contact after delivery was beneficial at 1 week postpartum but not at 4 months postpartum.
Hofmeyr et al., 1991 South Africa 1c,2,10	Low-income urban, first-time mothers delivering at a community hospital	Control: routine obstetrical care Int : during delivery a peer volunteer provided emotional support; she did not discuss breastfeeding or visit the mother in the postnatal wards	Contr: 75; Int: 74	At 6 weeks postpartum, 29% of the mothers were exclusively breastfeeding.	At 6 weeks postpartum, 51% of the mothers were exclusively breastfeeding ($p<0.01$).	Emotional support during delivery was beneficial, even though volunteers did not discuss breastfeeding.
Kistin, Abramson & Dublin, 1994 U.S.A. 1b,1c,2,10	Low-income minority women who intended to breastfeed and had requested a counselor, delivering at an urban public hospital	Control: women who requested a counselor but did not receive one due to inadequate numbers of trained counselors Int: women who talked with a trained volunteer peer counselor before delivery, at least twice weekly until breastfeeding was established, every 1-2 weeks for the next 2 months, and then as needed.	Contr: 43; Int: 59	At hospital discharge, 40% were exclusively breastfeeding. After >12 weeks postpartum, 7% were exclusively breastfeeding.	At hospital discharge, 77% were exclusively breastfeeding ($p<0.05$). After >12 weeks postpartum, 29% were exclusively breastfeeding ($p<0.05$).	Individual counseling by volunteer peers was beneficial.

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Sciacca et al., 1995 U.S.A. 1c,2,10	Low-income women	Control: breastfeeding education with 5-hour prenatal course, promotional materials, peer support program, & optional 15-minute group class. Int: same breastfeeding education as control group plus 2-hour class for woman & her partner, baby supplies geared to class attendance, free breast pump, and raffle prizes for exclusive or partial breastfeeding.	Contr: 29; Int: 26	55% of the mothers were exclusively breastfeeding at hospital discharge, and 17% at 3 months postpartum.	89% of the mothers were exclusively breastfeeding at hospital discharge ($p<0.05$), and 42% at 3 months postpartum ($p<0.05$).	The additional education, incentives, partner involvement, and breast pump were beneficial. Study did not determine which components were most useful.
Wiles, 1984 U.S.A. 1b,1c,8, 10	First-time mothers who wanted to breastfeed and attended childbirth education classes.	Control: routine obstetrical care Int: prenatal breastfeeding education class	Contr: 20; Int: 20	30% were "totally breastfeeding" at 1 month postpartum.	90% were "totally breastfeeding" at 1 month postpartum.	Prenatal education class was beneficial.

Part C. Studies Comparing the Same Group(s) before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Rea & Berquó, 1990 Brazil 1a,1b,2,7,9	Women of all income levels with a child aged 0-12 months in Greater São Paulo	Int: national breastfeeding campaign during 1981-86, including educating health workers on breastfeeding management, implementing rooming-in, restricting infant formula distribution, counseling mothers, and conducting extensive mass media campaigns.	Preint: 500; Postint: 497	In 1981 11% of children aged 5-6 months were exclusively breastfed. In 1981 mean duration of exclusive breastfeeding was 43 days.	In 1987 37% of children aged 5-6 months were exclusively breastfed. In 1987 mean duration of exclusive breastfeeding was 67 days.	The multifaceted national campaign appears to have been beneficial, although results must be interpreted with caution due to the 6-year time differential and possible confounding factors.

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Burkhalter & Marin, 1991 Chile 1a,1b,2,9	Low- and middle-income mothers using a peri-urban government health clinic	Int1: promotion of "exclusive" breastfeeding (breastmilk plus water by cup or spoon) consisted of: 4 prenatal lectures; monthly postnatal clinic visits; 8 home visits; counseling to address problems; and peer group encouragement. Int 2: same as Int 1 but 1 year after intervention had begun and in absence of program founder	Contr: 137; Int 1: 115; Int 2: 117	85% of infants were "exclusively" breastfed (breastmilk & water) at one month of age, 56% at 3 months, and 30% at 6 months.	Int 1: 95% of infants were "exclusively" breastfed (breastmilk & water) at one month of age ($p<0.05$), 80% at 3 months ($p<0.001$), and 74% at 6 months ($p<0.001$). Int 2: 87% of infants were "exclusively" breastfed (breastmilk & water) at one month of age (n.s.), 76% at 3 months ($p<0.01$), and 61% at 6 months ($p<0.001$).	The combination of prenatal and postnatal education, home visits, and peer group encouragement appear to have been beneficial in sustaining "exclusive" breastfeeding (breastmilk & water) longer.
Stone-Jiménez & de Maza, 1993 Guatemala 1a,1b,2,5	Low-income, low-literacy women in 17 peri-urban communities	Int: mother-to-mother support groups in 17 communities, training of volunteer breastfeeding advocates & educational materials	Preint: 250; Postint: 260	In 1990 16% of infants under 4 months and 10% of those under 6 months were exclusively breastfed.	In 1992 22% of infants under 4 months and 18% of those under 6 months were exclusively breastfed.	Mother-to-mother support groups and educational materials appear to have been beneficial.
NCP, 1995; Hernandez et al., 1995 Honduras 1a,7	Mothers of infants	Int: 21-month national breastfeeding campaign included print materials, radio spots and shows, theater performances, and training & educational aids for health workers.	Preint: 706 mothers; Postint: 554 mothers	The prevalence of exclusive breastfeeding was 48% for infants 1 month old, 24% for those aged 4 months, and 7% for those aged 6 months.	The prevalence of exclusive breastfeeding was 70% for infants 1 month old, 31% for those aged 4 months, and 12% for those aged 6 months.	The mass media campaign and training of health workers were beneficial. Print materials and radio spots had broader coverage than health workers.
Popkin et al., 1991; Huffman et al., 1991 Honduras 1a,2,5,9	Postpartum women living in 19 low-income communities of Tegucigalpa	Int: counseling in hospital maternity wards & home visits by breastfeeding specialists, training of health workers, changes in hospital practices to promote early initiation and rooming-in and eliminate routine formula feeding.	Preint: 449 new mothers; Postint: 166 new mothers	In 1982 65% of new mothers introduced some form of supplementation within one month of birth.	In 1985 40% of new mothers introduced some form of supplementation within one month of birth.	The combination of hospital counseling, training of health workers, changes in hospital practices & home visits appear to have been beneficial.

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Wellstart International, 1998 India 1a,5,7	Low-income women delivering at an urban hospital	Int changes in hospital policy: formula & bottles were banned, sick or premature babies fed with a spoon, only human milk was used, staff were trained, rooming-in and Human Milk Bank were established.	Sample size not reported.	In 1980 97% of infants were exclusively breastfed at birth, 74% at 3 months, and 45% at 6 months.	In 1990 100% of infants were exclusively breastfed at birth, 95% at 3 months, and 88% at 6 months.	The changes in hospital policy appear to have been beneficial.
Instituto Mexicano del Seguro Social (IMSS), [no date] Mexico 1a,1b,2,5	Mothers utilizing IMSS hospitals and child care facilities in Mexico City and Veracruz Norte	Int changes in hospital policy: Baby-Friendly Hospital Initiative, no infant formula samples, training of health workers, educational materials, monitoring, mothers' support groups, and postnatal follow-up linking primary health care posts with child care facilities.	Sample size not reported.	In 1991 44% of newborn infants were exclusively breastfed.	In 1993 48% of newborn infants were exclusively breastfed. In 1995 74% of newborn infants were exclusively breastfed.	The combination of approaches appear to have been beneficial, although confounding variables were not controlled.
Huffman, 1991 Panama 1a, 1c,2,5	Women delivering in Penonome Hospital, which serves a 75% rural area	Preint: newborn infants were fed breastmilk substitutes and kept in a separate nursery until hospital discharge 24 hours after delivery Int: hospital policies were changed to eliminate formula feeding and reduce mother-child separation to ½ -3 hours.	Sample size was not reported.	In 1984 30% of infants aged 2-4 months who attended a well-child clinic at Penonome Hospital were exclusively breastfed.	In 1986 57% of infants aged 2-4 months who attended a well-child clinic at Penonome Hospital were exclusively breastfed.	Changes in hospital practices appear to have been beneficial, although confounding variables were not controlled.
Creed-Kanashiro et al., 1994; Creed-Kanashiro et al., 1995 Peru 1a,2	Mothers in 9 low-income, urban communities	Int: community-based campaign provided short courses on lactation and weaning, videos, spots on loud speakers, posters, brochures & radio spots.	Preint: 254; Postint: 297	33% of children aged 0-4 months were exclusively breastfed. By 6 months of age, 93% of mothers had introduced infusions (liquids) and 65% had introduced foods.	43% of children aged 0-4 months were exclusively breastfed (n.s.). By 6 months of age, 84% of mothers had introduced infusions (liquids) ($p<0.01$). and 54% had introduced foods ($p<0.001$).	The major benefit of the community campaign was to delay introduction of liquids and foods.

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Nylander et al., 1991 Norway 1a,2,4,9	Women delivering at an urban hospital and attending local child health care centers	Preint: newborn infants were routinely given supplementary feedings during their 1st week of life. Int: the hospital changed its practices to promote early, frequent and unsupplemented breastfeeding. Health workers were trained and supervised by 2 physicians.	Preint: 204; Int: 203	At 1½ months after birth, 76% of infants were exclusively breastfed. This proportion fell to 57% at 3 months of age and 12% at 6 months of age. Mean duration of exclusive breastfeeding was 3.5 months.	At 1½ months after birth, 93% of infants were exclusively breastfed ($p<0.001$). This proportion fell to 75% at 3 months of age ($p<0.001$) and 22% at 6 months of age ($p<0.01$). Mean duration of exclusive breastfeeding was 4.5 months ($p<0.01$).	Changes in hospital practices appear to be beneficial, although confounding variables were not controlled.

n.s. = not significant

Methodological Limitations (based on WHO's *Evidence for the Ten Steps to Successful Breastfeeding*)

1. Inadequate control: (a) pre-post comparison without control group; (b) inadequate documentation of between-group differences and similarities; and (c) baseline behavioral measurements inadequate or lacking
2. Confounding variables not controlled
3. Self-selection of participants
4. High attrition (more than 10% attrition rate unevenly distributed)
5. Undetermined internal validity: unreported attrition, poorly documented methodology or unpublished brief communication
6. One-to-one comparison
7. Long recall period
8. Unclear definition of breastfeeding indicators
9. Based on planned or reported breastfeeding
10. Small sample size (<100)

Table 8. Continued Breastfeeding

Part A. Studies Comparing Intervention and Control or Comparison Groups before and after the Intervention

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Salariya, Easton & Cater, 1978 U.K. 8,9,10	First-time mothers who had chosen to breastfeed, delivering at an urban hospital	Contr: mothers who initiated breastfeeding 4-6 hours after delivery and breastfed every 4 hours; Int 1: mothers who initiated breastfeeding 4-6 hours after delivery and breastfed every 2 hours; Int 2: mothers who initiated breastfeeding within 10 minutes after delivery and breastfed every 4 hours; Int 3: mothers who initiated breastfeeding within 10 minutes after delivery and breastfed every 2 hours.	Contr: 28; Int 1: 27; Int 2: 27; Int 3: 29.	Median duration of breastfeeding was 77 days.	Median duration of breastfeeding was: Int 1: 112 days; Int 2: 140 days; Int 3: 182 days.	Early initiation and frequent feeding were beneficial.

Part B. Studies Comparing Intervention and Control or Comparison Groups (no baseline)

Author, Country, Methodological Limitations	Population Characteristics	Control/ Intervention	Sample Size	Results		Conclusion
				Control	Intervention	
Vandale-Toney et al., 1992 Mexico 1a,1c,4	First-time mothers delivering at a large urban hospital	Contr: women who delivered prior to hospital's new program Int: hospital adopted new program, including staff training in lactation management, promotion of early initiation, classes for 1st-time mothers, individual guidance in lactation management, and limitations on bottle feeding.	Contr: 175; Postint: 176	Median duration of breastfeeding was 12 weeks.	Median duration of breastfeeding was 17 weeks (n.s.). The difference in the proportion of infants still being nursed at 16 weeks was statistically significant.	Changes in hospital practices appear to have been somewhat beneficial.

Part C. Studies with Non-experimental Designs (Comparing One or More Groups Before and After the Intervention)

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Stone-Jiménez & de Maza, 1993 Guatemala 1a,1b,5	Low-income, low-literacy women in 17 peri-urban communities	Int: mother-to-mother support groups in 17 communities, training of volunteer breastfeeding advocates and educational materials.	Preint: 250; Postint: 260	In 1990 25% of children aged 20-24 months were breastfed.	In 1992 28% of children aged 20-24 months were breastfed.	Mother-to-mother support groups and educational materials did not appear to affect duration.
Popkin et al., 1991 Honduras 1a,2,5,9	Int:Urban women delivering at hospitals; 4 sites during 1983-85; 18 sites nationwide during 1986-89. Data: 3 national surveys of urban mothers of infants under 24 months	Radio spots began in 1981. In 1983-85 the PROALMA project implemented a combination of interventions in 4 sites: counseling in hospital maternity wards & home visits by breastfeeding specialists, training of health workers, changes in hospital practices to promote early initiation and rooming-in and eliminate routine formula feeding. In 1986-89 the PROALMA project expanded to 14 more sites.	1981 CFS, 468; 1984 MCH/FP survey, 530; 1987 EFHS, 995.	In 1981 median duration of breastfeeding among urban women was 4.1 months.	Median duration of breastfeeding among urban women was 8.9 months in 1984 and 9.9 months in 1987.	The combination of hospital counseling, training of health workers, changes in hospital practices, & home visits appears to have been beneficial, although other factors cannot be ruled out.
Bradley & Meme, 1992 Kenya 1a,1b,2,9	Hospital policy-makers and senior staff and maternity ward staff in 58 hospitals nationwide	Int: national breastfeeding program: adoption of Code of Marketing of Breastmilk Substitutes, directives to hospitals to promote early breastfeeding & rooming-in, and training of health workers.	Preint: 195 health workers; Postint: 109 hospital policy-makers & senior staff; 175 maternity ward staff	Mean duration of breastfeeding was less than 14 months in 1979.	Mean duration of breastfeeding was 19.4 months in 1989.	The national program adopted in 1982 was followed by an increase in breastfeeding duration.

Author, Country, Methodological Limitations	Population Characteristics	Intervention	Sample Size	Results		Conclusion
				Pre-intervention	Post-intervention	
Saunders & Carroll, 1988 U.S.A. 1a,1c,2,5,9,10	Low-income, predominantly Hispanic women living in rural New Mexico; all initiated breastfeeding at the hospital after delivery	Int: mothers were exposed to one or more of 3 interventions: (1) a hospital visit 1-3 days postpartum to discuss breastfeeding; (2) a telephone call or letter 4-5 days postpartum; and (3) a structured group support class at 2 weeks postpartum.	Preint: 75; Postint: 80	The proportion of women breastfeeding dropped from 100% post-delivery to 71% at 4 weeks postpartum and 47% at 16 weeks.	Among women who received all three interventions, the proportion breastfeeding dropped from 100% post-delivery to 95% at 4 weeks postpartum and 67% at 16 weeks ($p<0.001$ to 0.05).	Mothers who had support during the 1st 2 weeks postpartum breastfed longer than other mothers.

n.s. = not significant

Methodological Limitations (based on WHO's *Evidence for the Ten Steps to Successful Breastfeeding*)

1. Inadequate control: (a) pre-post comparison without control group; (b) inadequate documentation of between-group differences and similarities; and (c) baseline behavioral measurements inadequate or lacking
2. Confounding variables not controlled
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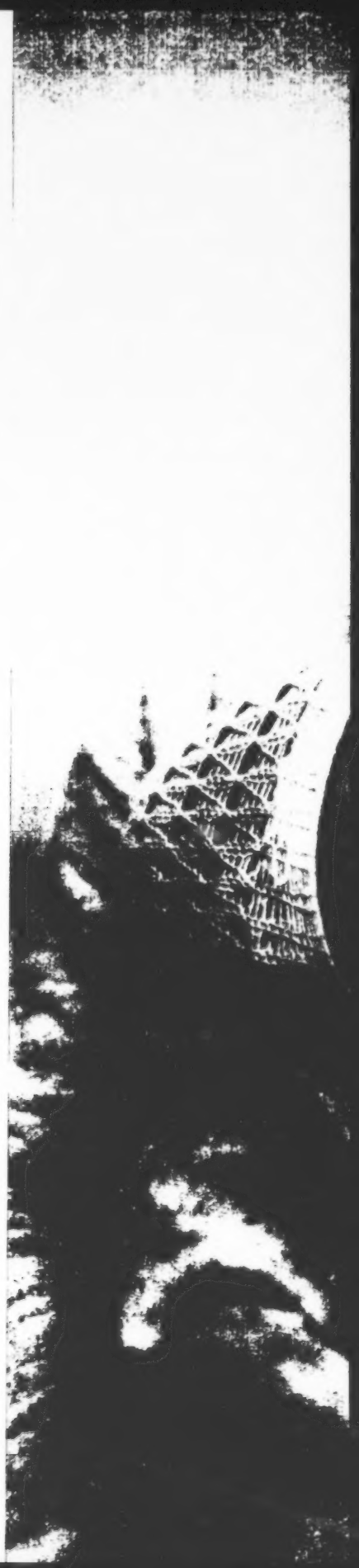
4. High attrition (more than 10% attrition rate unevenly distributed)
5. Undetermined internal validity: unreported attrition, poorly documented methodology or unpublished brief communication
6. One-to-one comparison
7. Long recall period
8. Unclear definition of breastfeeding indicators
9. Based on planned or reported breastfeeding
10. Small sample size (<100)



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